



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

## CRATAEGUS IN MISSOURI.

BY CHARLES SPRAGUE SARGENT.

In this paper an attempt is made to record the information in regard to the Missouri species of *Crataegus* which has been brought together in the last eight years. In it are also included descriptions of several of the species which occur on the bottoms of the Mississippi River in Illinois opposite St. Louis as these seem naturally to belong to the St. Louis flora. This, however, must be considered merely a preliminary study of the subject, for *Crataegus* has been systematically observed and collected at a few places only in Missouri, and there are still many counties, including all that part of the state north of the Missouri River, in which there is every reason to believe that the genus abounds and in which no collections have been made. The existence, too, of several undescribed Missouri species is indicated by incomplete material preserved in the herbaria of the Arnold Arboretum and of the Missouri Botanical Garden, which cannot yet be satisfactorily determined.

Exclusive of the seven Illinois species, there are described in this paper one hundred and three species, and of these only five are now known to extend beyond the borders of the state, although no doubt some of the southern species will be found in northern Arkansas where *Crataegus* has been very little investigated.

An examination of the groups into which the Missouri species fall naturally throws some light on the distribution of these groups and shows what a barrier the wide bottomlands of the Mississippi have been in the spread westward of several of them.

The *Crus-galli* Group, with thirty-seven endemic species, is the largest of the Missouri groups. Plants of this group are very abundant in the southern part of the state, in Arkansas, western Louisiana and eastern Texas, where they sometimes grow to a large size. Rare in the northeastern part

of the country, and nowhere very abundant in the region east of the Mississippi River, this is the characteristic group of the region west of the Mississippi River from southern Missouri to the Gulf.

Although *Crataegus punctata* Jacquin, the type of the Punctatae Group, one of the most widely distributed of the northeastern species, and common in central and northern Illinois, does not cross the Mississippi River, this group is well represented in the southern part of the state. In addition to the eleven species described in this paper, there are evidences that several other Punctatae are to be found in the southeastern counties, including perhaps *Crataegus colina* Chapman, of the southern Appalachian region.

Of the Virides Group, the best represented of the natural groups with the exception of the Crus-galli in southern Arkansas, western Louisiana and eastern Texas, *Crataegus viridis* Linnaeus is one of the four species of wide distribution which reaches Missouri. Five other species of this group described in this paper are found only on the Mississippi bottoms in Illinois, and four have not been seen beyond the boundaries of the state.

The Pruinosae, which is one of the large and most generally distributed of the northeastern groups, is represented in Missouri by sixteen species, and appears to be pretty generally distributed over the state, at least in that part of it south of the Missouri River.

Of the Tenuifoliae, which is the largest of all the groups in the northeastern part of the country, no representative has been found in Missouri, although many Tenuifoliae occur in northern Illinois. The Flabellatae, too, which abound in the region extending from New England through New York, Ontario and southern Michigan to northern Illinois, where they often grow to a large size, appear to be entirely absent from Missouri and probably do not cross the Mississippi River.

In the Molles Group, which is very generally distributed from the St. Lawrence River valley and eastern New England to eastern Nebraska and Kansas, eleven species are here described. In the eastern states many of the species in

this group have only ten stamens; west of the Mississippi River only species with twenty stamens have been found. Of the Missouri species of this group only *Crataegus mollis* Scheele extends beyond the limits of the state, and one other of the species now described is found only on the Mississippi bottoms in Illinois. Species in this group abound in the neighborhood of St. Louis and in Jackson and Jasper Counties. One species still undescribed occurs in Taney County, and although one species is known in Shannon County and another in St. François County, the Molles Group cannot be considered very abundant in the southeastern part of the state.

It is interesting to find in parts of the state remote from one another two species of the small group of *Dilatatae* which is otherwise distinctly northeastern, with species extending from Quebec and eastern Massachusetts to New York and southern Ontario.

The *Coccineae* Group, which is most abundant in species on the New England seacoast and the valley of the St. Lawrence River and to which belong the most northern species of the genus in America, is represented in Missouri by a single rather abnormal species, *Crataegus Margaretta* Ashe, first discovered in the neighborhood of St. Louis but now known to range to middle Tennessee, Iowa and southern Ontario.

The *Uniflorae*, a group of a few small shrubs otherwise found in the Atlantic-coast region from New Jersey southward and on the foothills of the southern Appalachian Mountains, appears in southern Missouri with a single distinct species; while four Missouri species represent the *Intricatae*, a large eastern and southern Appalachian group most abundant in species in eastern Pennsylvania and extending to southern Michigan and to Mississippi, but west of the Mississippi River found only in Shannon and Taney Counties, Missouri. Of the three species of the *Microcarpae* Group only one, *Crataegus cordata* Aiton, reaches southern Missouri from the Atlantic states, although in Jasper County there are indications that an undescribed species of this group occurs.



The great Tomentosae Group, with only thirteen species, is certainly not as well represented in Missouri as it is in many parts of the country east of the Mississippi River, especially in Ontario, where the species of this group form a considerable part of the *Crataegus* vegetation. It seems remarkable that only three species of the thick-leaved section of this group have been found in Missouri, although species of thick-leaved Tomentosae are common in northern Illinois. The type of this group, *Crataegus tomentosa* Linnaeus, is one of the four species of wide distribution which have been found in Missouri.

No representative of the great Flavae Group, which is the prevailing and most generally distributed group in the south-eastern states, has been found in Missouri where there are no indications of the existence of the small but interesting eastern Anomalae Group or of the Bracteatae, Pulcherrimae, Triflorae, Aestivales or Brachycarpae, small southern groups.

Although I have made a number of visits to Missouri in the last eight years to study *Crataegus* and to introduce the most interesting of these plants into the Arnold Arboretum, the real work of collecting and field observation in the genus has been chiefly done in Missouri by Mr. B. F. Bush of Courtney, Jackson County, who has made many journeys in the southern counties to collect *Crataegus*, by Mr. E. J. Palmer of Webb City, Jasper County, which is one of the richest known *Crataegus* regions in the state, and by Mr. J. H. Kellogg of the Missouri Botanical Garden, who has worked assiduously during several years to increase the knowledge of these plants in the neighborhood of St. Louis. Unaided by their zeal, patience and industry, it would have been impossible for me to have prepared this preliminary report.

An earlier student of *Crataegus* in Missouri is Mr. G. W. Letterman of Allenton, St. Louis County, who began to study the genus before 1880. In that year he sent seeds of *Crataegus* to the Arboretum; and from these seeds were raised the plants which have since been described as *Crataegus nitida*, *Crataegus fecunda*, *Crataegus coccinioides*, *Crataegus Dawsoniana* and *Crataegus succincta*; and it was the

flowering and fruiting of these plants in the Arboretum that first showed me the variety and importance of the Missouri *Crataegus* flora and led me to undertake its investigation.

It is a great satisfaction to me that the results of this investigation appear among the publications of the Missouri Botanical Garden; for Professor Trelease has often been my companion in journeys made for the purpose of studying *Crataegus* in the field; and the resources of the Garden for many years have been freely devoted to aiding these studies.

### SYNOPSIS OF GROUPS.

- A. Nutlets without ventral cavities. (Groups CRUS-GALLI to MICROCARPAE.)
  - a. Veins of the leaves extending to the points of the lobes only. (Groups CRUS-GALLI to UNIFLORAE.)
  - b. Veins of the leaves extending to the points of the lobes and to the sinuses. (Group MICROCARPAE.)
- B. Nutlets with longitudinal cavities on their ventral faces. (Group TOMENTOSAE.)

### CRUS-GALLI.

Leaves subcoriaceous to coriaceous or less commonly thin, obovate to oval, ovate or rhombic, cuneate at the base, usually serrate only above the middle, without lobes except on vigorous shoots, their veins usually thin and often within the parenchyma; petioles short, usually eglandular; fruit subglobose to short-oblong, oval or ovate, 7-25 mm. in diameter, with thin usually greenish flesh; nutlets 1-3, rarely 4 or 5.

Leaves subcoriaceous to coriaceous.

Corymbs, leaves and branchlets glabrous or slightly hairy while young.

Stamens 8-10 (occasionally 15 in No. 2, 5-10 in No. 6, and 5-8 in No. 13).

Anthers rose color or pink.

Leaves oblong-obovate, rounded or occasionally acute at the apex.

Flowers in 15-20-flowered corymbs; anthers pink; fruit short-oblong to ovate, dull red.

1. *C. strongylophylla*.

Flowers in 10-18-flowered corymbs; anthers 10-15; styles 3-5; fruit short-oblong to subglobose, dull red blotched with green.

2. *C. discolor*.

Leaves oblong-obovate, acute and short-pointed at the apex; anthers pink; fruit short-oblong to ovate.

Flowers in mostly 10-14-flowered corymbs; calyx-lobes villose on the inner surface; styles 2; fruit dull yellow, with an orange-red cheek; spines slender, usually straight.

3. *C. infesta*.

Flowers in mostly 7-10-flowered corymbs; calyx-lobes glabrous; style generally 1; fruit bright orange-red blotched with green; spines stout, usually strongly hooked.

4. *C. hamata*.

Leaves oblong-obovate, acuminate, with prominent mid-ribs and veins; flowers in many-flowered corymbs; anthers pale salmon color; fruit subglobose, dark red flushed with green. 5. *C. severa*.

Leaves obovate, usually acuminate or rounded at the apex; flowers in 15-20-flowered corymbs; stamens 5-10; anthers pale salmon color; fruit short-oblong, dull red blotched with green.

6. *C. tardiflora*.

Leaves oblong-obovate to oval.

Leaves coarsely serrate; flowers in many-flowered corymbs; pedicels slightly hairy while young; anthers dark rose color; fruit short-oblong to subglobose, orange-red.

7. *C. fecunda*.

Leaves finely serrate; flowers in 4-7-flowered corymbs; pedicels glabrous; anthers pink; fruit oval to ovate, dull green, with a reddish cheek.

8. *C. tenuis*.

Leaves oval to rhombic; flowers in mostly 10-12-flowered corymbs; anthers rose color; fruit subglobose to short-oblong, dull red. 9. *C. tantula*.

Anthers yellow.

Leaves oblong-obovate, rounded or acute at the apex.

Flowers in 15-25-flowered corymbs; fruit subglobose to obovate. 10. *C. barrettiana*.

Flowers in mostly 7-12-flowered corymbs.

Primary veins mostly within the parenchyma.

Calyx-lobes villose on the inner surface; fruit broader than high, truncate at the ends, slightly angled, dark crimson; spines stout.

11. *C. efferta*.

Calyx-lobes glabrous; fruit subglobose to short-oblong or slightly obovate, scarlet; spines slender.

12. *C. ferox*.

Primary veins prominent.

Leaves rounded or rarely acute at the apex; fruit short-oblong to slightly obovate, rounded at the ends, dull crimson, 7-8 mm. in diameter.

13. *C. albanthera*.

Leaves acute, rounded and short-pointed or acuminate at the apex; fruit short-oblong, truncate at the ends, scarlet, up to 1.5 cm. long.

14. *C. pachyphylla*.

Leaves oblong-obovate, acuminate, or rarely rounded at the apex; flowers in mostly 12-16-flowered corymbs; stamens 5-8, usually 5 or 6; fruit short-oblong, dark red.

15. *C. candens*.

Leaves narrowly obovate, acute or acuminate or rarely rounded at the apex, their veins mostly within the parenchyma; flowers in usually 10-12-flowered corymbs; styles generally 1; fruit oval to ovate, dull red.

16. *C. monosperma*.

Leaves oblong-obovate, rounded or truncate at the broad apex, their veins mostly within the parenchyma; flowers in compact 5-15-flowered corymbs; fruit short-oblong to slightly obovate, crimson.

17. *C. truncata*.

Leaves oval to slightly obovate, acute or acuminate at the apex, their veins within the parenchyma; flowers in 10-15-flowered corymbs; fruit subglobose to short-oblong, crimson; spines small and slender, often wanting.

18. *C. tenuispina*.

Leaves broadly obovate to oblong, rounded or acute at the apex, their veins within the parenchyma; flowers in many-flowered corymbs; fruit subglobose, dull green tinged with red.

19. *C. Palmeri*.

Stamens 20.

Anthers rose color or pink.

Flowers in 7-10-flowered corymbs; anthers pink; styles 2-4, usually 3; fruit often broader than high, bright cherry-red; leaves on vigorous shoots broadly ovate to orbicular.

20. *C. rotunda*.

Flowers in 5- or 6-flowered corymbs; anthers rose color; styles often 5; fruit short-oblong, pale cherry-red; leaves on vigorous shoots ovate to oval.

21. *C. parciflora*.

Anthers yellow; leaves broadly ovate to obovate, their veins mostly within the parenchyma; flowers in wide many-flowered corymbs; fruit subglobose, crimson.

22. *C. jasperensis*.

Corymbs, leaves and young branches more or less villose or pubescent during the season.

Stamens 10.

Anthers rose or pale salmon color.

Pedicels only slightly hairy; calyx-tube glabrous.

Mature leaves smooth on the upper surface; anthers rose color; fruit orange-red, with a yellow cheek.

23. *C. Engelmanni*.

Mature leaves scabrate on the upper surface; anthers pale salmon color; fruit green tinged with red.

24. *C. hirtella*.

Pedicels densely villose; calyx-tube hairy; anthers pale salmon color; fruit dark red.

25. *C. barbata*.

Anthers pale yellow.

Leaves smooth on the upper surface; corymbs broad, many-flowered, slightly villose; calyx glabrous.

26. *C. pilifera*.

Leaves scabrate on the upper surface; corymbs compact, few-flowered, densely villose; calyx villose.

27. *C. villiflora*.

Leaves comparatively thin.

Corymbs, leaves and branchlets glabrous or slightly hairy while young.

Anthers rose color (pink in No. 29).

Stamens 10.

Flowers in 8-12-flowered corymbs.

Leaves oblong-obovate, hairy only on the upper side of the midribs in early spring; fruit short-oblong, green tinged with red, 1-1.2 cm. in length.

28. *C. permora*.

Leaves short-obovate, bright red and covered above by short white hairs in early spring; anthers pale pink; fruit subglobose, bright orange-red, 8-9 mm. in diameter.

29. *C. rubrifolia*.

Flowers in 5- or 6-flowered corymbs; fruit oval,  
orange-red. 30. *C. consueta*.

Stamens 15; flowers in 5- or 6-flowered corymbs;  
fruit short-oblong, orange-red.

31. *C. tenuisepala*.

Stamens 20; flowers in 10-15-flowered corymbs; fruit  
short-oblong to obovate, bright orange-red.

32. *C. leptophylla*.

Anthers yellow.

Stamens 10.

Leaves lustrous above.

Flowers in many-flowered corymbs.

Leaves oval to oblong-obovate, acute or  
acuminate at the apex; fruit short-  
oblong, bright scarlet.

33. *C. acutifolia*.

Leaves rhombic to oval or slightly ovate;  
fruit subglobose to short-oblong, orange-  
red.

34. *C. rubrisepala*.

Flowers in mostly 7-12-flowered corymbs;  
leaves obovate, rounded or acute at the apex;  
fruit oval to subglobose, scarlet.

35. *C. rudis*.

Leaves dull green, ovate to obovate; flowers in  
many-flowered corymbs; fruit subglobose,  
flattened at the ends, dark dull crimson.

36. *C. erecta*.

Stamens 20; leaves oval to obovate or suborbicular,  
rounded or acute at the apex, coarsely serrate;  
flowers in 8-10-flowered corymbs, slightly villose  
while young; fruit subglobose, dark dull crimson.

37. *C. insignis*.

Corymbs, leaves and young branches more or less villose or  
pubescent during the season.

Stamens 10; anthers rose color; corymbs compact, mostly  
6-8-flowered.

Leaves oblong-obovate, usually acuminate; corymbs  
sparingly villose; fruit crimson, lustrous, on glabrous  
pedicels.

38. *C. setosa*.

Leaves oblong-obovate to oval, rounded or acute at the  
apex; corymbs densely villose; fruit scarlet, pruinose,  
on hairy pedicels.

39. *C. munita*.

Stamens 10-15; anthers pink; corymbs slightly villose,  
broad, usually 15-20-flowered; leaves oblong-obovate,  
rounded or acute at the apex; fruit dull crimson blotched  
with green.

40. *C. vallicola*.

### 1. *Crataegus stronglyphylla*, n. sp.

Glabrous. Leaves oblong-obovate, rounded at the broad apex or very rarely acute, gradually narrowed to the concave-cuneate entire base, and sharply often doubly serrate above, with straight or incurved glandular teeth; more than half-grown when the flowers open from the 10th to the middle of May and then thin, yellow-green and lustrous above and paler below, and at maturity subcoriaceous to coriaceous, dark yellow-green and very lustrous on the upper surface, dull light yellow-green on the lower surface, 4–5.5 cm. long and 2.5–3 cm. wide, with prominent yellow midribs, and thin usually prominent primary veins; petioles stout, narrow-wing-margined nearly to the base, glandular towards the apex, with often persistent glands, 7–10 mm. in length. Flowers about 1 cm. in diameter, on long slender pedicels, in lax mostly 15–20-flowered corymbs, the much elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes gradually narrowed from wide bases, acuminate and red at the apex, entire or furnished near the middle with occasional glandular teeth, reflexed after anthesis; stamens 10; anthers pink; styles 1–3. Fruit ripening in October, on slender reddish pedicels, in 6–12-fruited drooping clusters, short-oblong to ovate, full and rounded at the ends, dull red, marked by large dark dots, 8–10 mm. long and 6–9 mm. in diameter; calyx little enlarged, with a deep narrow cavity, and spreading and incurved persistent lobes; flesh thin, greenish yellow, dry and mealy; nutlets 1–3, gradually narrowed and rounded at the ends, prominently ridged on the back, with a broad high grooved ridge, 7–8 mm. long, and 4–4.5 mm. wide, or when 1, 6–6.5 mm. in diameter.

A tree 2–4 m. high, with a small stem, large horizontal wide-spreading branches, and stout nearly straight branchlets dark orange-green and marked by pale lenticels when they first appear; orange-green or chestnut-brown and lustrous in their first season and dull reddish brown the following year, and armed with numerous stout straight or slightly curved purple shining spines 3.5–5 cm. long.

Dry rocky hills. Jasper County, common; near Webb City, *E. J. Palmer* (No. 31 type) May 9 and October 4, 1907; Neck City, *E. J. Palmer*, April 28, 1907.

### 2. *Crataegus discolor*, n. sp.

Glabrous with the exception of the hairs on the upper side of the young leaves and petioles and on the calyx-lobes. Leaves obovate-cuneate, rounded or acute at the apex, and finely serrate above the middle, with incurved glandular teeth; when they unfold deeply tinged with red and covered on the upper surface with soft white hairs, nearly half-grown when the flowers open during the first week in May and then thin, yellow-green, lustrous and slightly hairy along the midribs above, and glaucous below,

and at maturity thin but firm in texture, light yellow-green and lustrous on the upper surface, pale on the lower surface, 3-4 cm. long and 2-2.5 cm. wide, with slender yellow midribs, and thin primary veins mostly within the parenchyma; petioles slender, narrow-wing-margined nearly to the base, soon glabrous, 4-6 mm. in length; leaves on vigorous shoots broadly obovate, usually rounded and short-pointed at the apex, or rhombic to oval and acuminate, more coarsely serrate, and often 5-5.5 cm. long and 4-4.5 cm. wide, with foliaceous lunate coarsely serrate stipules. Flowers 1.5-1.7 cm. in diameter, on long slender pedicels, in wide mostly 10-18-flowered corymbs, the long slender lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes wide, acuminate and rose-colored at the apex, minutely glandular-serrate, sparingly villose on the inner surface, reflexed after anthesis; stamens 10-15, usually 10; anthers pale rose color; styles 3-5, surrounded at the base by a ring of pale hairs. Fruit ripening the middle of October, on slender drooping pedicels, in few-fruited clusters, short-oblong to subglobose, full and rounded at the ends, dull red more or less blotched with green, 8-10 mm. in diameter; calyx little enlarged, with a narrow shallow cavity, and small closely appressed persistent lobes; flesh thin, yellow-green, dry and mealy; nutlets 3-5, gradually narrowed and rounded at the ends, or when 5 acute at the ends, ridged on the back, with a high broad deeply grooved ridge, 6.5-7 mm. long, and about 4 mm. wide.

A tree 6-8 m. high, with a trunk 1.5-3 dm. in diameter, horizontal branches forming a broad flat-topped head, and stout slightly zigzag branchlets light orange-green and marked by pale lenticels when they first appear, becoming dark red-brown in their first season and dull gray the following year, and armed with numerous stout straight spines 4-5 cm. long.

Near Grandin, Carter County, *B. F. Bush* (No. 3 type), May 6 and Oct. 10, 1905, (No. 3 A) Oct. 11, 1905, also (Nos. 365, 393, 411, 412 and 413) May 1901.

### 3. *Crataegus infesta*, n. sp.

Glabrous with the exception of the hairs on the upper surface of the young leaves and on the calyx-lobes. Leaves erect, oblong-obovate, acute and short-pointed or rounded at the apex, and coarsely serrate above the middle, with incurved glandular teeth; slightly hairy on the upper surface when they unfold, very thin, light yellow-green, lustrous and glabrous above, with the exception of a few hairs on the midribs, and pale below when the flowers open in the first week of May, and at maturity coriaceous, light yellow-green and very lustrous on the upper surface, paler on the lower surface, 3-3.5 cm. long and 1.5-1.8 cm. wide, with thin midribs rose-colored toward the base, and slender mostly prominent primary veins; petioles stout, narrow-wing-margined nearly to the base,



deep rose color in the autumn, 3-4 mm. in length. Flowers 1.2-1.4 cm. in diameter, on long slender pedicels, in crowded mostly 10-14-flowered corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes gradually narrowed from the base, long, slender, acuminate, irregularly glandular-dentate, glabrous on the outer, sparingly villose on the inner surface, reflexed after anthesis; stamens 8-10; anthers pink; styles 2. Fruit ripening at the end of September, on stout erect or spreading pedicels, in 2- or 3-fruited clusters, short-oblong to ovate, dull yellow, with an orange-red cheek, 1-1.1 cm. long and 9-10 mm. in diameter; calyx prominent, with a short tube, a wide deep cavity broad in the bottom, and spreading persistent lobes; flesh thin, green, dry and hard; nutlets usually 2, rounded and obtuse at the ends, ridged on the back, with a broad low ridge, 6.5-7 mm. long, and 3-3.5 mm. wide.

A tree 3-5 m. high, with a trunk often 1 dm. in diameter, covered with dark scaly bark, large spreading and erect branches forming a round-topped head, and stout branchlets green tinged with red and marked by pale lenticels when they first appear, becoming light chestnut-brown and very lustrous in their first season and dull red-brown the following year, and armed with very numerous slender straight or slightly curved dark purple shining spines 4.5-5 cm. long and persistent on old stems and branches; or often shrubby in habit.

Dry limestone hills, Pacific, Franklin County, *J. H. Kellogg* (No. 2 type), May 8, 1905, *J. H. Kellogg* and *C. S. Sargent*, September 29, 1907.

#### 4. *Crataegus hamata*, n. sp.

Glabrous with the exception of the hairs on the upper surface of the young leaves and petioles. Leaves erect at the ends of the branches, oblong-obovate, and short-pointed or rounded at the apex, gradually narrowed to the entire base, and finely serrate above the middle, with incurved glandular teeth; about one-third grown when the flowers open in the first week of May and then thin, yellow-green, smooth, lustrous and slightly hairy along the midribs above and pale below, and at maturity subcoriaceous, smooth, lustrous, light yellow-green and glabrous on the upper surface, pale on the lower surface, 5.5-6 cm. long and 3-5 cm. wide, with thick midribs, and slender prominent primary veins; petioles stout, narrow-wing-margined, slightly hairy on the upper side while young, soon becoming glabrous, occasionally glandular, 7-8 mm. in length; leaves on vigorous shoots obovate, acuminate and abruptly short-pointed at the apex, acuminate at the base, more coarsely serrate, slightly lobed above the middle, 6-7 cm. long and 4.5-5 cm. wide, with rose-colored midribs, more prominent veins and stout broadly winged rose-colored petioles. Flowers

about 1.2 cm. in diameter, on long slender pedicels, in small mostly 7-10-flowered corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes gradually narrowed from the base, short, wide, acuminate, irregularly glandular-serrate, reflexed after anthesis; stamens 8-10; anthers pink; styles 1 or 2, usually 1. Fruit ripening the middle of October, on very slender red pedicels, in few-fruited drooping clusters, short-oblong to ovate, light orange-red more or less blotched with pale green, lustrous, marked by large dark dots, 1.2-1.3 cm. long and 1.1-1.2 cm. in diameter; calyx little enlarged, with a deep narrow cavity, and small spreading often deciduous lobes; flesh thick, yellow-green, rather juicy; nutlets 1 or 2, usually 1, gradually narrowed to the rounded ends, slightly ridged on the back, with a narrow grooved ridge, 7-8 mm. long, and 4-4.5 mm. in diameter.

A tree 3-4 m. high, with a stout stem 7.5-10 cm. in diameter, covered with dark scaly bark, small erect and slightly spreading branches forming a wide irregular head, slender zigzag branchlets dark orange-green when they first appear, becoming light dull chestnut-brown and marked by small pale lenticels in their first season and light gray-brown the following year, and armed with stout hooked or occasionally nearly straight purplish shining ultimately dull gray spines 3.5-4 cm. long.

Pacific, Franklin County, *J. H. Kellogg* (No. 6 type), October 19, 1901, May 8, 1905, *J. H. Kellogg* and *C. S. Sargent*, Sept. 27, 1907, (No. 4) *J. H. Kellogg*, May and October 1905.

5. *CRATAEGUS SEVERA* Sargent, *Trees and Shrubs*, ii. 59, t. 127 (1908).

Banks of streams, Grandin, Carter County, *C. S. Sargent* (No. 5) October 1900, *B. F. Bush* (No. 410), May 1901.

6. *Crataegus tardiflora*, n. sp.

Glabrous with the exception of the hairs on the inner surface of the calyx-lobes. Leaves obovate, rounded or usually acuminate at the apex, gradually narrowed to the concave-cuneate entire base, and finely serrate above the middle, with incurved glandular teeth; deeply tinged with red when they unfold, nearly fully grown when the flowers open from the 20th to the end of May and then yellow-green, smooth and lustrous above and pale below, and at maturity subcoriaceous, dark yellow-green, smooth and lustrous on the upper surface, dull bluish green on the lower surface, 4-5 cm. long and 2.5-3 cm. wide, with stout prominent yellow midribs, and thin prominent primary veins; petioles stout, wing-margined to the base, 5-7 mm. in length; leaves on vigorous shoots acuminate at the ends, coarsely

serrate, often 5-8 cm. long and 3.5-4 cm. wide, with stouter midribs and petioles, more prominent primary veins, and foliaceous lunate serrate stipules. Flowers 1.2-1.3 cm. in diameter, on long slender pedicels, in wide lax mostly 15-20-flowered corymbs, the elongated lower peduncles from the axils of the upper leaves; calyx-tube narrowly obconic, the lobes long, slender, acuminate, entire or minutely dentate near the middle, sparingly villose on the inner surface, reflexed after anthesis; stamens 5-10; anthers pale salmon color; styles 1 or 2, or rarely 3. Fruit ripening early in October, on long slender drooping pedicels, in few-fruited clusters, short-oblong, full and rounded at the ends, dull red blotched with green, 1-1.2 cm. in diameter; calyx little enlarged, with a deep narrow cavity, and slightly spreading or incurved often deciduous lobes; flesh thin, green, dry and hard; nutlets 1-3, rounded and obtuse at the ends, ridged on the back, with a high broad slightly grooved ridge, 7-7.5 mm. long, and about 3 mm. wide, or when 1, 5.5-6 mm. in diameter.

A tree often 4 or 5 m. high, with a trunk sometimes 1.5-2 dm. in diameter, small spreading branches forming a wide flat-topped head, and stout slightly zigzag branchlets dark orange-green faintly tinged with red when they first appear, becoming dull reddish brown in their first season and ashy gray the following year, and armed with numerous slender nearly straight chestnut-brown shining ultimately dark gray spines 2-4.5 cm. long.

Roadsides five miles north of Swan, in Christian County, *B. F. Bush* (No. 16 type), Sept. 28, 1905, April 20 and May 26, 1907.

This is the last of the *Crus-galli* species of this region to flower.

7. *CRATAEGUS FECUNDA* Sargent, Bot. Gazette, xxxiii. 111 (1902); Silva N. Am. xiii. 47, t. 641; Manual, 371, f. 289.

Near Allenton, St. Louis County, and Mississippi River bottoms, East St. Louis, Illinois.

8. *Crataegus tenuis*, n. sp.

Leaves oblong-obovate to oval, acute or acuminate and short-pointed or rounded at the apex, gradually narrowed and cuneate at the entire base, and finely crenately serrate above; about half-grown when the flowers open at the end of April or early in May and then thin, light yellow-green and hairy along the midribs above and pale and occasionally villose on the midribs below, and at maturity subcoriaceous, glabrous, dark green and lustrous on the upper surface, dull green on the lower surface, 2.5-3.5 cm. long and 1.5-1.8 cm. wide, with thin midribs, and obscure primary veins

mostly within the parenchyma; petioles stout, slightly wing-margined, often rose color in the autumn, 4-5 mm. in length; leaves on vigorous shoots oval to slightly obovate, rounded and short-pointed at the apex, abruptly concave-cuneate at the base, 3-4 cm. long and 2-2.5 cm. wide, with stouter rose-colored midribs, and more prominent primary veins. Flowers about 1 cm. in diameter, on long slender glabrous pedicels, in mostly 4-7-flowered simple corymbs; calyx-tube narrowly obconic, the lobes gradually narrowed from the base, broad, short, acuminate and glandular at the apex, entire or minutely and irregularly glandular-dentate, reflexed after anthesis; stamens 10; anthers pink; styles 2. Fruit ripening in October, on slender erect pedicels, in few usually 1- or 2-fruited clusters, oval to ovate, dull green, with a reddish cheek, marked by large pale dots, 9-10 mm. long and 6-7 mm. in diameter; calyx prominent, with a short tube, a deep narrow cavity, and large spreading and erect persistent lobes; flesh green, thin, dry and hard; nutlets 2, obtuse and rounded at the ends, slightly ridged on the back, 6-6.5 mm. long, and 4.5-5 mm. wide.

A tree sometimes 7 m. high, with a tall trunk 2-2.5 dm. in diameter, covered with very dark scaly bark, small spreading branches forming an oblong round-topped head, and very slender nearly straight glabrous branchlets light reddish brown and marked by pale lenticels when they first appear, becoming light chestnut-brown and lustrous in their first season and dull gray the following year, and armed with numerous slender nearly straight purple shining spines 3-4 cm. long.

Pacific, Franklin County, *J. H. Kellogg* (No. 7 type), May 2, 1905, *J. H. Kellogg* and *C. S. Sargent*, September 29, 1907.

### 9. *Crataegus tantula*, n. sp.

Glabrous with the exception of the hairs on the young leaves, calyx-lobes and branchlets. Leaves oval to rhombic or to ovate or occasionally obovate, acuminate, gradually narrowed to the concave-cuneate entire base, and finely serrate above, with straight or incurved glandular teeth; nearly half-grown when the flowers open about the 20th of May and then thin and yellow-green, villose above along the midribs, with long white deciduous hairs, and slightly hairy in the axils of the veins below, and at maturity subcoriaceous, dark green and very lustrous on the upper surface, pale yellow-green on the lower surface, 3-4 cm. long and 1.5-2 cm. wide, with slender yellow midribs, and obscure primary veins within the parenchyma; petioles slender, slightly wing-margined at the apex, sparingly villose while young, becoming glabrous, often rose color in the autumn, 5-7 mm. in length. Flowers 1.2-1.3 cm. in diameter, on long slender glabrous pedicels, in small mostly 10-12-flowered crowded corymbs, the lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, gla-

brous, the lobes slender, acuminate, entire or minutely dentate near the middle, glandular on the outer, slightly villose on the inner surface, reflexed after anthesis; stamens 10; anthers rose color; styles 2 or 3, usually 3. Fruit ripening the end of October, on long slender drooping pedicels, in few-fruited clusters, subglobose to short-oblong, dark red, marked by large dark dots, 7-8 mm. in diameter; calyx prominent, with a deep shallow cavity, and spreading or incurved persistent lobes; flesh thin, hard, yellow-green, dry and mealy; nutlets usually 3, gradually narrowed and rounded at the ends, ridged on the back, with a low grooved ridge, 5-5.5 mm. long, and 3-3.5 mm. wide.

A tree 5-8 m. high, with a trunk 2-3 dm. in diameter, covered with dark rough scaly bark, spreading branches forming a broad round-topped head, and small slender branchlets light orange color and covered with long pale hairs when they first appear, soon becoming glabrous, light chestnut-brown, lustrous and marked by small pale lenticels in their first season and orange or reddish brown the following year, and unarmed or furnished with short slender nearly straight dark purplish spines.

Thickets and the borders of woods, in low moist soil, near Webb City, Jasper County, *B. F. Bush* (No. 10 type), May 23, 1901, *E. J. Palmer* and *C. S. Sargent*, Oct. 2, 1901, *E. J. Palmer*, Oct. 20, 1901.

This handsome plant is well distinguished from related species by its small usually oval or rhombic leaves, by its small flowers and fruits and the infrequency of its spines.

#### 10. *Crataegus barrettiana*, n. sp.

Glabrous with the exception of the hairs on the calyx-lobes. Leaves oblong-obovate, rounded or occasionally acute and short-pointed at the apex, gradually narrowed to the concave-cuneate entire base, and sharply serrate above the middle, with straight glandular teeth; nearly fully grown when the flowers open from the 10th to the middle of May and then thin, dark yellow-green and lustrous above and pale below, and at maturity thin, dark yellow-green, smooth and lustrous on the upper surface, pale yellow-green on the lower surface, 4-4.5 cm. long and 2-3 cm. wide, with thin midribs, and prominent primary veins; petioles slender, narrow-wing-margined to below the middle, 6-7 mm. long; leaves on vigorous shoots usually rounded at the apex, more coarsely serrate, and often 5.5-6.5 cm. long and 4.5-5 cm. wide. Flowers about 1.2 cm. in diameter, on long very slender pedicels, in wide mostly 15-25-flowered corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes long, slender, acuminate and glandular at the apex,

entire or occasionally minutely dentate near the middle, glabrous on the outer, sparingly villose on the inner surface, reflexed after anthesis; stamens 10; anthers pale yellow; styles 2 or 3. Fruit ripening and falling late in September, on slender drooping pedicels, in few-fruited clusters, subglobose to slightly obovate, dull red or bronze color, marked by small pale dots, 1-1.2 cm. in diameter; calyx little enlarged, with a deep narrow cavity tomentose in the bottom, and small spreading lobes mostly deciduous from the ripe fruit; flesh thin, dry, green and hard; nutlets 2 or 3, gradually narrowed and rounded at the ends, irregularly ridged on the back, with a high broadly grooved ridge, 7-7.5 mm. long, and about 4 mm. wide.

A shrub 3 or 4 m. high, with stout stems covered with dark red-brown scaly bark, small ascending and spreading branches forming a narrow open head, and slender nearly straight branchlets dark orange-green more or less tinged with red and marked by pale lenticels when they first appear, becoming dark chestnut-brown and lustrous in their first season and dull red-brown the following year, and armed with stout or slender, straight or slightly curved, dark chestnut-brown shining spines 3-4 cm. long.

Rich bottom-lands in White Oak woods near Barrett's Station, St. Louis County, *J. H. Kellogg* (No. 2 type), May 9, 1903, May 13, 1907, *J. H. Kellogg* and *C. S. Sargent*, September 28, 1907.

#### 11. *Crataegus efferta*, n. sp.

Glabrous with the exception of the hairs on the upper surface of the young leaves and on the calyx-lobes. Leaves oblong-obovate, acute or rounded at the apex, gradually narrowed to the slender concave-cuneate entire base, and finely serrate above the middle, with incurved glandular teeth; nearly fully grown when the flowers open in the first week of May and then very thin, dark yellow-green and slightly hairy on the midribs above and pale bluish green below, and at maturity thick to subcoriaceous, dark yellow-green and very lustrous on the upper surface and pale bluish green on the lower surface, 4-5 cm. long and 2-3 cm. wide, with slender yellow midribs, and thin primary veins within the parenchyma; petioles stout, wing-margined to below the middle, often rose color in the autumn, 6-7 mm. in length. Flowers 1.4-1.5 cm. in diameter, on long slender pedicels, in wide mostly 10- to 12-flowered corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, glabrous, the lobes gradually narrowed from the base, wide, long, green and acuminate at the apex, irregularly glandular-dentate, glabrous on the outer, slightly villose on the inner surface, reflexed after anthesis; stamens 10; anthers

pale yellow; styles 1 or 2, surrounded at the base by a narrow ring of pale tomentum. Fruit ripening and falling at the end of September, on slender drooping pedicels, in few-fruited clusters, broader than high, truncate at the ends, slightly angled, dark crimson, lustrous, marked by occasional large pale dots, 1.2–1.3 cm. in diameter; calyx little enlarged, with a deep narrow cavity, and erect and slightly incurved green persistent lobes; flesh thin, light yellow-green, solid, rather juicy; nutlets 2, rounded and obtuse at the ends, ridged on the back, with a broad low slightly grooved ridge, 7–8 mm. long, and about 4 mm. wide, or when 1, 5–6 mm. in diameter.

A tree 5–6 m. high, with a tall trunk 1.5–1.8 dm. in diameter, covered with light red-brown scaly bark, large spreading branches forming a broad flat-topped head, and stout nearly straight branchlets light orange-green and marked by pale lenticels when they first appear, becoming light olive-green at the end of their first season and dull gray-brown the following year, and armed with stout straight or slightly curved chestnut-brown ultimately dull gray spines 2–5 cm. long.

Dry limestone hills, Pacific, Franklin County, *J. H. Kellogg* (No. 1 type), May 8, 1905, *J. H. Kellogg* and *C. S. Sargent*, September 29, 1907, (No. 5) *J. H. Kellogg*, May 8, 1905.

## 12. *Crataegus ferox*, n. sp.

Glabrous with the exception of a few caducous hairs on the upper surface of the young leaves. Leaves oblong-obovate, rounded or acute at the apex, gradually narrowed to the entire base, and finely doubly serrate above, with incurved glandular teeth; nearly half-grown when the flowers open the middle of May and then thin, dark green and shining above and pale below, and at maturity dark green and lustrous on the upper surface, pale on the lower surface, 4–5 cm. long and 2.5–3 cm. wide, with stout midribs often rose-colored in the autumn, and obscure primary veins mostly within the parenchyma; petioles stout, wing-margined nearly to the base, 5–6 mm. in diameter; leaves on vigorous shoots broadly obovate, acute or rounded at the apex, more coarsely serrate, often 6–7 cm. long and 5–6 cm. wide. Flowers 1.2–1.3 cm. in diameter, on slender pedicels, in wide lax mostly 7–12-flowered corymbs, the long slender lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes short, slender, acuminate, entire or occasionally dentate near the middle, reflexed after anthesis; stamens 10; anthers pale yellow; styles 1 or 2, surrounded at the base by a narrow ring of pale hairs. Fruit ripening the end of October, on slender spreading or drooping pedicels, in few-fruited clusters, subglobose to short-oblong or often slightly obovate, scarlet, frequently flushed with yellow, lustrous, marked by large dark dots, 1.2–1.4 cm. long, 1–1.2 cm. in diameter; calyx little enlarged, with a shallow narrow

cavity, and small spreading and incurved lobes, their tips often deciduous from the ripe fruit; flesh thin, yellow, dry and mealy; nutlets 1 or 2, full and rounded at the ends, ridged on the back, with a broad grooved ridge, 6-7 mm. long, and 4-4.5 mm. wide, or when 1, 5-5.5 mm in diameter.

A shrub 5-8 m. high, with several large slightly spreading stems, covered with dark scaly bark, spreading branches forming a broad round-topped head, and stout zigzag branchlets light orange-brown when they first appear, becoming rather darker orange-brown, slightly lustrous and marked by large pale lenticels in their first season, and dull gray-brown the following year, and armed with very numerous slender slightly curved purple spines 4-8 cm. long, usually pointed toward the base of the branch, and persistent and compound on old stems and branches.

Hillsides, Prosperity Junction, near Webb City, Jasper County, *B. F. Bush* (No. 3 A or 534 type), May 19, 1901, *E. J. Palmer*, Oct. 27, 1901, *B. F. Bush* (No. 3 or 533), May 19, 1901, *E. J. Palmer* and *C. S. Sargent*, Oct. 2, 1901, *B. F. Bush* (No. 3 D or 537), May 19, 1901, *E. J. Palmer* (No. 3 G), Oct. 27, 1901, *B. F. Bush* (No. 3 H or 541), May 19, 1901, *E. J. Palmer*, Oct. 27, 1901, *B. F. Bush* (No. 3 I or 542), May 19, 1901, *E. J. Palmer*, (No. 27) August 8, 1906, May 9 and 14 and October 4, 1907, (No. 27 C) October 13 and November 13, 1907; Neck City, Jasper County, *E. J. Palmer*, (Nos. 10, 10 A, 10 B) April 28, 1907, (No. 13) April 28 and October 4, 1907.

### 13. *Crataegus albanthera*, n. sp.

Glabrous with the exception of a few hairs on the upper side of the midribs of the young leaves. Leaves oblong-obovate, rounded or rarely acute at the apex, gradually narrowed from near the middle to the concave-cuneate entire base, and finely doubly serrate above, with straight glandular teeth; nearly fully grown when the flowers open from the first to the middle of May and then light yellow-green, lustrous and slightly hairy along the midribs above and pale below, and at maturity subcoriaceous, dark yellow-green and lustrous on the upper surface, pale bluish green on the lower surface, 3.5-4.5 cm. long and 1.5-2.5 cm. wide, with thin midribs, and very slender generally prominent primary veins; petioles stout, wing-margined nearly to the base, often tinged with rose color in the autumn, 7-8 mm. in length. Flowers about 1.5 cm. in diameter, on short slender pedicels, in small compact mostly 7-12-flowered corymbs, the lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes short and



broad, minutely glandular-dentate, tinged with rose color, reflexed after anthesis; stamens 10; anthers white or white faintly tinged with yellow; styles 2. Fruit short-oblong, or sometimes slightly obovate, rounded at the ends, dull crimson, 7–8 mm. in diameter; calyx little enlarged, with a deep narrow cavity, and spreading slightly incurved lobes; flesh thin, green, dry and hard; nutlets 2, rounded at the ends, slightly ridged on the back, about 5 mm. long, and 3 mm. wide.

A tree sometimes 7 m. high, with a trunk 1.2–1.5 dm. in diameter, and slender often contorted branchlets dark green tinged with red and marked by pale lenticels when they first appear, becoming light chestnut-brown in their first season and dull reddish brown the following year, and armed with slender straight or slightly curved ashy gray spines 2.5–3.5 cm. long.

Rocky hills and glades, Swan, Taney County, *B. F. Bush* (No. 21 A type), April 24 and October 7, 1907, (No. 21) April 24, 1907.

#### 14. *Crataegus pachyphylla*, n. sp.

Glabrous with the exception of the hairs on the upper surface of the young leaves. Leaves obovate, acute, rounded and short-pointed or acuminate at the apex, gradually narrowed to the concave-cuneate entire base, and coarsely often doubly serrate above the middle, with straight or incurved glandular teeth; nearly half-grown when the flowers open in the first week of May and then thin, yellow-green, smooth, lustrous and slightly hairy along the midribs above and paler below, and at maturity coriaceous, yellow-green, glabrous and very lustrous on the upper surface, pale yellow-green on the lower surface, 4–6 cm. long and 2–3 cm. wide, with stout midribs, and thin prominent primary veins; petioles slender, wing-margined nearly to the base, often rose color in the autumn, 7–12 mm. in length; leaves on vigorous shoots broadly obovate, rounded and frequently short-pointed at the apex, and often 6–7 cm. long and 4–5 cm. wide. Flowers about 1.2 cm. in diameter, on long slender pedicels, in mostly 10–12-flowered crowded corymbs, the much elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes gradually narrowed from the base, long, slender, acuminate, entire or minutely dentate near the middle, reflexed after anthesis; stamens 10; anthers large, pale yellow; styles 2 or 3. Fruit ripening and falling early in October, on long stout drooping stems, in few-fruited clusters, short-oblong, truncate at the ends, depressed at the insertion of the pedicels, scarlet, very lustrous, marked by many large dark dots, 1.5–1.7 cm. long and 1.4–1.5 cm. in diameter; calyx little enlarged, with a deep narrow cavity pointed in the bottom, and small spreading usually deciduous lobes; flesh thick, light yellow-green, hard and bitter; nutlets 2 or 3, gradually

narrowed and rounded at the ends, prominently ridged on the back, with a broad high deeply grooved ridge, 8–8.5 mm. long, and 4.5–5 mm. wide.

A tree 5 or 6 m. high, with a tall trunk 1.5–2 dm. in diameter, covered with pale gray scaly bark, small short spreading branches forming a narrow round-topped head, and slender nearly straight branchlets light orange-green and marked by pale lenticels when they first appear, becoming light reddish brown and lustrous in their first season and dull red-brown the following year, and armed with many slender slightly curved chestnut-brown spines 4–7 cm. long.

Low moist soil, Osage, Cole County, *J. H. Kellogg*, (No. 7 type), May 5, 1905, May 6 and October 1, 1907.

#### 15. *Crataegus candens*, n. sp.

Glabrous with the exception of the hairs on the young leaves. Leaves oblong-obovate, acuminate or rarely rounded at the apex, gradually narrowed to the long entire cuneate base, and finely serrate usually only above the middle, with straight glandular teeth; tinged with red when they unfold, more than half grown when the flowers open the middle of May and then thin, dark yellow-green, very lustrous and sparingly villose along the midribs above and paler and glabrous below, and at maturity subcoriaceous, glabrous, dark green and lustrous on the upper surface, pale bluish green on the lower surface, 4.5–6 cm. long and 2.5–3.5 cm. wide, with thin midribs, and slender primary veins within the parenchyma; petioles stout, narrow-wing-margined nearly to the base, occasionally glandular, with minute deciduous glands, 7–8 mm. in length; leaves on vigorous shoots thicker, more coarsely serrate, and often 7–8 cm. long and 3.5–4 cm. wide, with stout midribs and prominent primary veins. Flowers 1.2–1.4 cm. in diameter, on long slender pedicels, in wide lax mostly 12–16-flowered corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes gradually narrowed from the base, long, slender, acuminate and glandular at the apex, entire or occasionally dentate below the middle, reflexed after anthesis; stamens 5–8, usually 5 or 6; anthers pale yellow; styles 1 or 2. Fruit ripening early in October, on slender drooping pedicels, in few-fruited clusters, and usually persistent longer than the leaves, short-oblong, full and rounded at the ends, dark red, marked by numerous large pale dots, 1.2–1.5 cm. long and 1–1.2 cm. in diameter; calyx little enlarged, with a narrow deep cavity, and small spreading appressed lobes; flesh thin, green, dry and hard; nutlets 1 or 2, slightly narrowed and rounded at the apex, obtuse and rounded at the base, ridged on the back, with a broad low slightly grooved ridge, 7–8 mm. long, and 4–4.5 mm. wide, or when 1, 6–6.5 mm. in diameter.

A tree 5-9 m. high, with a trunk 7.5-15 cm. in diameter, covered with dark scaly bark, small spreading branches forming a flat-topped head, and stout slightly zigzag branchlets dark orange-green and marked by numerous pale lenticels when they first appear, becoming dull orange-brown in their first season and light gray-brown the following year, and armed with few slender straight or slightly curved purple shining spines 2.5-3 cm. long.

Gravelly banks of small streams, Monteer, Shannon County, common; *B. F. Bush* (No. 6 B type), May 14 and October 6, 1905, (No. 6) May 15 and October 3, 1905, May 26, 1907, (No. 6 A) May 12 and October 3, 1905, (No. 6 C) May 27, 1907; Grandin, Carter County, *B. F. Bush* (No. 2) May 8 and October 11, 1905, (Nos. 2 A, 2 B and 2 C) May and October 1905.

16. ***Crataegus monosperma*, n. sp.**

Glabrous with the exception of the hairs on the young leaves and calyx-lobes. Leaves narrowly obovate, acute, acuminate or rarely rounded at the apex, gradually narrowed and concave-cuneate at the slender acuminate entire base, and sharply serrate above, with long straight glandular teeth; nearly fully grown when the flowers open from the 10th to the middle of May and then thin, dark yellow-green, very lustrous and slightly villose along the midribs above and pale bluish green and glabrous below, and at maturity subcoriaceous, dark green and very lustrous on the upper surface, paler and bluish green on the lower surface, 5-6 cm. long and 2.5-3 cm. wide, with prominent yellow midribs, and very slender mostly prominent primary veins; petioles stout, narrow-wing-margined nearly to the base, 6-7 mm. in length; leaves on vigorous shoots ovate to slightly obovate, acute, rounded or abruptly pointed at the apex, coarsely doubly serrate, and often 7-8 cm. long and 4.5-5 cm. wide. Flowers about 1.5 cm. in diameter, on long slender pedicels, in wide lax mostly 10-12-flowered corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes long, slender, acuminate, minutely dentate, very sparingly villose on the inner surface, reflexed after anthesis; stamens 10; anthers pale yellow; styles 1 or rarely 2. Fruit ripening early in October, on long slender drooping pedicels, in few-fruited clusters, oval to ovate, dull red, marked by numerous pale dots, 1-1.1 cm. long and 9-10 mm. in diameter; calyx prominent, with a deep narrow cavity, and erect and incurved persistent lobes; flesh thin, yellowish green, dry and hard; nutlet 1, acute at the apex, full and rounded at the base, slightly 2-ridged, 7.5-8 mm. long, and 5-6 mm. in diameter.

A tree sometimes 7 m. high, with a tall trunk 1.5-2 dm. in diameter, covered with dark scaly bark, small erect branches forming an open irregular head, and slender nearly straight branchlets deeply tinged with red and marked by numerous pale lenticels when they first appear, becoming darker-colored in their first season and light ashy gray the following year, and armed with thin nearly straight purplish spines 3.5-4 cm. long.

Swan Creek bottoms near Swan, Taney County, *B. F. Bush* (No. Q type), May 20 and October 7, 1907.

**17. *Crataegus truncata*, n. sp.**

Glabrous with the exception of a few hairs on the upper side of the midribs of the young leaves and on the calyx-lobes. Leaves oblong-obovate, rounded, truncate and abruptly short-pointed or slightly obcordate at the broad apex, or rarely acuminate, gradually narrowed to the slender concave-cuneate entire base, and finely glandular-serrate usually only above the middle, with incurved glandular teeth; more than half-grown when the flowers open from the 10th to the middle of May and then thin, yellow-green and slightly villose along the midribs above and pale below, and at maturity thin and firm to subcoriaceous, yellow-green and very lustrous on the upper surface, pale yellow-green on the lower surface, 4-5 cm. long and 2-3.5 cm. wide, with prominent pale yellow midribs, and thin primary veins mostly within the parenchyma; petioles slender, narrow-wing-margined to below the middle, 5-7 mm. in length. Flowers about 1.5 cm. in diameter, on slender pedicels, in small compact 5-15-flowered corymbs, the long lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes slender, acuminate and glandular at the apex, entire or slightly glandular-serrate near the middle, very sparingly villose on the inner surface, reflexed after anthesis; stamens 10 or sometimes 5-8; anthers yellow; styles 1 or 2, usually 2. Fruit ripening the end of September, on long slender reddish drooping pedicels, in few-fruited clusters, short-oblong to slightly obovate, rounded at the ends, crimson, lustrous, marked by numerous pale dots, 1-2 cm. long, 8-10 mm. in diameter; calyx little enlarged, with a deep narrow cavity, and small spreading persistent lobes; flesh thin, green and dry; nutlets usually 2, narrowed and rounded at the base, obovate and rounded at the broader apex, slightly ridged on the back, 6-6.5 mm. long, and 3-3.5 mm. wide.

A tree 8-12 m. high, with a trunk 7-15 cm. in diameter, spreading branches forming a broad round-topped head, and slender nearly straight branchlets light orange-brown and marked by large pale lenticels when they first appear, becoming light chestnut-brown and lustrous in their first season and

dull gray-brown the following year, and armed with stout straight or slightly curved purplish shining ultimately ashy gray spines 2.5–4 cm. long.

Rocky hills and glades, Swan, Taney County, *B. F. Bush* (No. 13 type), May 21 and Sept. 22, 1905, May 16, 1907, (No. 13 A) May 16, and October 7, 1907.

This species is remarkable in the shape of the leaves which are generally broad and frequently truncate or obcordate at the apex.

### 18. *Crataegus tenuispina*, n. sp.

Glabrous with the exception of a few hairs on the upper side of the midribs of the young leaves. Leaves oval to slightly obovate, acute or acuminate at the ends, and coarsely serrate above the middle, with incurved glandular teeth; faintly tinged with red when they unfold, almost fully grown when the flowers open about the 1st of May and then thin, yellow-green and very lustrous above and paler below, and at maturity subcoriaceous, dark green and lustrous on the upper surface, light yellow-green on the lower surface, 4–6 cm. long and 1.5–2.5 cm. wide, with stout yellow midribs, and thin prominent primary veins deeply impressed on the upper side of the leaf; petioles slender, narrowly wing-margined to below the middle, often rose color in the autumn, 7–8 mm. in length; leaves on vigorous shoots thicker, broadly ovate or obovate, more coarsely serrate, sometimes 6–6.5 cm. long and 4–4.5 cm. wide. Flowers 1.2–1.3 cm. in diameter, on slender pedicels, in wide lax mostly 10–15-flowered corymbs, the long thin lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes slender, acuminate and glandular at the apex, entire or slightly dentate near the middle, reflexed after anthesis; stamens 10; anthers small, pale yellow; styles 2 or 3, surrounded at the base by a narrow ring of pale hairs. Fruit ripening early in October, on slender spreading and drooping pedicels, in few-fruited clusters, subglobose to short-oblong, crimson, lustrous, marked by large pale dots, 9–10 mm. in diameter; calyx little enlarged, with a deep narrow cavity, and small spreading lobes often deciduous from the ripe fruit; flesh thin, yellow-green, dry and mealy; nutlets 2 or 3, full and rounded at the ends, ridged on the back, with a broad grooved ridge, 6–7 mm. long, and 3.5–4 mm. wide.

A tree 7–10 m. high, with a trunk often 1.2 dm. in diameter, covered with dark scaly bark, small spreading and ascending branches forming a broad head, and slender nearly straight branchlets dark purple and marked by large pale lenticels when they first appear, becoming light chestnut-brown and lustrous in their first season and pale reddish brown the fol-

lowing year, and unarmed or armed with occasional small slender nearly straight chestnut-brown shining spines 1-1.5 or occasionally 2 cm. long.

Gravelly banks of small streams near Grandin, Carter County, *B. F. Bush* (Nos. 394, 404, 405, 406, 407), May 8, 1901, (No. 5 type) May 6 and Oct. 11, 1905, (No. 5 A) May 7 and Oct. 10, 1905.

*Crataegus tenuispina* is well distinguished from the other *Crus-galli* species by its narrow acuminate leaves and by its small weak and infrequent spines.

19. **CRATAEGUS PALMERI** Sargent, *Trees and Shrubs*, i. 57, t. 29 (1903); *Manual*, 381, f. 300.

Dry bark, and near streams in rich moist soil, Webb City and Carthage, Jasper County.

20. ***Crataegus rotunda*, n. sp.**

Glabrous with the exception of a few caducous hairs on the upper surface of the young leaves and on the inner surface of the calyx-lobes. Leaves obovate-cuneate, acute or rounded at the apex, and coarsely serrate above the middle, with straight or incurved glandular teeth; more than half-grown when the flowers open the middle of May and then thin, yellow-green and lustrous above and pale below, and at maturity subcoriaceous, dark yellow-green, smooth and very lustrous on the upper surface, pale yellow-green on the lower surface, 3.5-4 cm. long and 2-2.5 cm. wide, with thin midribs, and slender prominent primary veins; turning in the autumn bright clear yellow before falling; petioles stout, wing-margined to below the middle, occasionally glandular, 1.2-1.4 cm. in length; leaves on vigorous shoots coriaceous, broadly ovate to orbicular, short-pointed, very coarsely serrate, occasionally slightly lobed, 5-7 cm. in diameter, with broad-winged glandular petioles and foliaceous lunate coarsely serrate persistent stipules. Flowers 1.2-1.3 cm. in diameter, on long slender pedicels, in mostly 7-10-flowered corymbs, the elongated slender lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes slender, acuminate, entire, slightly villose on the inner surface, reflexed after anthesis; stamens 20; anthers pink; styles 2-4, usually 3. Fruit ripening from the first to the middle of November, on slender drooping stems, in generally 1-5-fruited clusters, subglobose or often rather broader than high, light cherry-red, 1.3-1.5 cm. in diameter; calyx prominent, with a short tube, a broad deep cavity, and nearly triangular spreading lobes often deciduous from the ripe fruit; flesh thick, pale yellow-green, dry and mealy; nutlets 3-5, gradually narrowed and rounded at the ends, rounded and grooved or slightly ridged on the back, 5.5-7 mm. long, and 4.5-5 mm. wide.

A tree 5-6 m. high, with a trunk 2-3 dm. in diameter, covered with dark scaly bark, spreading branches forming a wide flat or round-topped head, and stout zigzag branchlets light orange-yellow when they first appear, becoming bright chestnut-red, very lustrous and marked by large pale lenticels in their first season and light reddish brown the following year, and armed with many stout or slender nearly straight light chestnut-brown shining spines 2-4 cm. long, persistent and becoming compound on old stems and branches.

Prairies near Webb City, Jasper County, *E. J. Palmer*, (No. 21 type) November 3, 1901, May 16, 1903; Prosperity Junction, near Webb City, *B. F. Bush*, (No. 2 B) May 19, 1901, *E. J. Palmer*, Oct. 27, 1901, (No. 2, with 10-15 stamens) *E. J. Palmer* and *C. S. Sargent*, Oct. 2, 1901, *E. J. Palmer* Oct. 22, 1901, May 6, 1902; Joplin, Jasper County, *E. J. Palmer*, (No. 3) Oct. 13, 1907; common.

## 21. *Crataegus parciflora*, n. sp.

Glabrous with the exception of a few hairs on the upper side of the midribs of the young leaves and petioles, and on the calyx-lobes. Leaves broadly obovate to ovate, rounded or acute at the apex, abruptly or gradually concave-cuneate at the entire base, and finely doubly serrate usually to below the middle, with straight glandular teeth; very thin and conspicuously pale yellow when they unfold, not more than one-third grown when the flowers open during the first week of May and then thin, yellow-green above and pale bluish green below, and at maturity subcoriaceous, light yellow-green and lustrous on the upper surface, paler on the lower surface, 4-5 cm. long and 3-4.5 cm. wide, with prominent yellow midribs, and very thin prominent primary veins; petioles slender, narrowing-margined to below the middle, often rose-colored in the autumn, 1-1.2 cm. in length; leaves on vigorous shoots coriaceous, ovate or oval, rounded or acute and short-pointed at the apex, abruptly cuneate at the base, coarsely serrate, occasionally slightly lobed, often 5.5-6 cm. long and nearly as broad. Flowers 1.4-1.5 cm. in diameter, on slender pedicels, in mostly only 5- or 6-flowered corymbs, the lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes slender, acuminate, entire or minutely glandular-serrate, villous on the inner surface, reflexed after anthesis; stamens 20; anthers rose color; styles 3-5. Fruit ripening the end of October, on slender drooping pedicels, in usually 2-5-flowered clusters, short-oblong, full and rounded at the ends, pale cherry-red, marked by large dark dots, 9-10 mm. long and 8-9 mm. in diameter; calyx little enlarged, with a broad shallow cavity, and spreading sometimes slightly incurved persistent lobes; flesh thin, yellow-green, dry

and mealy; nutlets 3-5, thin, narrowed and rounded, or when 5 acute at the ends, slightly ridged on the back, with a thin grooved ridge, 5-5.5 mm. long, and about 3 mm. wide.

A tree 4-5 m. high on dry hills or 7 or 8 m. high on moist bottoms, with a trunk 1.5-3 dm. in diameter, covered with dark scaly bark, small horizontal branches forming a round-topped head, and stout slightly zigzag branchlets light orange-green when they first appear, becoming light chestnut-brown, lustrous and marked by small pale lenticels in their first year and dark red-brown in their second season, and armed with numerous slender nearly straight light chestnut-brown shining spines 2.5-5 cm. long.

Dry rocky hillsides, and in rich soil near small streams, Prosperity Junction, near Webb City, Jasper County, *E. J. Palmer* and *C. S. Sargent* (No. 1 type), Oct. 2, 1901, *E. J. Palmer*, Oct. 27, 1901, May 6, 1902.

This species is unusual in the *Crus-galli* group in its few-flowered corymbs, and in the number of styles, which are often 5. The small thin nutlets are also unusual in this group.

## 22. *Crataegus jasperensis*, n. sp.

Glabrous with the exception of the hairs on the upper surface of the young leaves and on the calyx-lobes. Leaves broadly ovate to obovate, rounded or acute and short-pointed at the apex, gradually narrowed to the concave-cuneate entire base, and finely often doubly serrate above the middle, with straight or incurved glandular teeth; nearly fully grown when the flowers open the middle of May and then thin, yellow-green, smooth, lustrous, and slightly hairy on the midribs above and pale below, and at maturity subcoriaceous, glabrous, yellow-green and lustrous on the upper surface, pale bluish green on the lower surface, 4-5 cm. long and 2-3 cm. wide, with thin midribs, and slender primary veins mostly within the parenchyma; petioles slender, narrow-wing-margined nearly to the base, often rose color in the autumn, 6-7 mm. in length; leaves on vigorous shoots thicker, oval to ovate, short-pointed, coarsely serrate nearly to the base, often 5 cm. long and 4 cm. wide, with stout broadly winged petioles. Flowers 1.6-1.8 cm. in diameter, on long slender pedicels, in wide many-flowered corymbs, the lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes gradually narrowed from the base, slender, acuminate, entire or minutely glandular-dentate, glabrous on the outer, sparingly villose on the inner surface, reflexed after anthesis; stamens 20; anthers pale yellow; styles 4, surrounded at the base by a narrow ring of pale tomentum. Fruit ripening late in October, on slender



erect or spreading pedicels, in few-fruited clusters, subglobose, crimson, marked by large pale dots, 8-9 mm. in diameter; calyx little enlarged, with a deep narrow cavity, and small spreading lobes dark red on the upper side; flesh thin, yellow-green, dry and hard; nutlets 4, gradually narrowed and rounded at the ends, slightly ridged on the back, 5.5-6 mm. long, and 2.5-3 mm. wide.

A tree, with slender nearly straight branchlets dark orange-red and marked by pale lenticels when they first appear, becoming bright chestnut-brown and lustrous in their first season and dull reddish brown the following year, and armed with stout nearly straight dark chestnut-brown spines 4.5-5.5 cm. long.

Near Webb City, Jasper County, *E. J. Palmer* (No. 2 X type), May 15, 1904, October 1907.

23. *CRATAEGUS ENGELMANNI* Sargent, Bot. Gazette, xxxi. 2 (1901); Silva N. Am. xiii. 43, t. 639; Manual, 378, f. 297.

Kimmswick, Jefferson County, *G. Engelmann*, 1860; near Allenton, St. Louis County, and Pacific, Franklin County.

24. *Crataegus hirtella*, n. sp.

Leaves oblong-obovate, rounded or acute at the apex, gradually narrowed to the slender concave-cuneate entire base, and finely often doubly serrate above, with straight or incurved glandular teeth; deeply tinged with red and covered with long soft white hairs when they unfold, about half-grown when the flowers open from the 10th to the middle of May and then yellow-green, lustrous, setose, and villose along the midribs above and pale and hirsute on the base of the midribs below, and at maturity subcoriaceous, yellow-green and scabrate on the upper surface, pale yellow-green on the lower surface, 3-4 cm. long and 1.5-2 cm. wide, with prominent yellow still hairy midribs, and thin primary veins; petioles stout, narrow-wing-margined nearly to the base, villose especially while young, 6-7 mm. in length; leaves on vigorous shoots long-pointed and acuminate, thicker, more coarsely serrate, 5-6 cm. long and 2.5-3 cm. wide, with stouter midribs and petioles, and more prominent primary veins. Flowers 1.3-1.5 cm. in diameter, on long slender slightly villose pedicels, in compact mostly 6-12-flowered hairy corymbs, the long lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, glabrous, the lobes slender, tipped with bright red glands at the acuminate apex, entire, or minutely dentate near the middle, glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 10; anthers pale salmon color; styles 1-3. Fruit ripening early in October, on long slender slightly hairy reddish pedicels, in few-fruited clusters, subglobose to short-oblong,

full and rounded at the ends, green tinged with red, about 1 cm. in diameter; calyx little enlarged, with a broad deep cavity, and small spreading and ascending lobes; flesh thin, green, dry and hard; nutlets 1-3.

A tree 4-5 m. high, with a trunk 1.5-1.8 dm. in diameter, covered with dark scaly bark, large spreading branches forming a wide round-topped head, and stout nearly straight branchlets, dull brown, slightly hairy and marked by large pale lenticels when they first appear, becoming light chestnut-brown, lustrous and glabrous in their first season and light gray tinged with red the following year, and armed with numerous stout straight light red-brown ultimately gray spines 4-6 cm. long.

Dry rocky hills near Swan, Taney County, *B. F. Bush* (No. 6 type), September 25, 1905, May 6 and October 7, 1907, (Nos. 6 B, 6 C and 6 D) May 16, 1907.

## 25. *Crataegus barbata*, n. sp.

Leaves oblong-obovate, acute or rarely rounded at the apex, gradually narrowed to the concave-cuneate entire base, and finely serrate above the middle, with straight glandular teeth; when the flowers open the middle of May thin, yellow-green, lustrous and roughened by short white hairs and villose along the midribs above, and pale and villose below along the midribs and veins. Flowers 1.2 cm. in diameter, on short hairy pedicels, in broad villose corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, coated with matted pale hairs, the lobes slender, acuminate, minutely dentate above the middle, glabrous on the outer, pubescent on the inner surface, reflexed after anthesis; stamens 10 or often only 5, 6 or 8; anthers pale salmon color; styles 2 or 3. Fruit ripening early in October, on slender slightly hairy drooping pedicels, in few-fruited clusters, subglobose to short-oblong, dark red, lustrous, marked by large pale dots, 8-9 mm. in diameter; calyx prominent, with a deep narrow cavity, and spreading nearly glabrous lobes; flesh thin, green, dry and hard; nutlets usually 2, narrowed and obtuse at the ends, slightly ridged on the back, 5-5.5 mm. long, and about 3 mm. wide.

A shrub 3-4 m. high, with small stems covered with dark bark, small horizontal branches forming a broad flat-topped head, and stout slightly zigzag branchlets light orange color and covered with long white hairs when they first appear, becoming glabrous and lustrous in their first season and light gray-brown the following year, and armed with stout slightly curved purple shining spines 3-3.5 cm. long.

Rocky hills and glades, near Swan, Taney County, *B. F. Bush* (No. 26 type), May 18 and October 7, 1907.\*

**26. *Crataegus pilifera*, n. sp.**

Leaves oblong-obovate, rounded or acute at the apex, gradually narrowed and concave-cuneate at the entire often glandular base, and coarsely serrate above the middle, with straight or incurved glandular teeth; more than half-grown when the flowers open about the 20th of May and then thin, yellow-green and slightly hairy on the upper side of the midribs and veins, and sparingly villose on the midribs below, and at maturity subcoriaceous, dark green, very lustrous and nearly glabrous on the upper surface, and paler and glabrous on the lower surface, 3.5–4.5 cm. long and 1.7–2 cm. wide, with prominent yellow midribs, and obscure primary veins mostly within the parenchyma; petioles stout, narrowly wing-margined to below the middle, villose while young, becoming nearly glabrous, glandular, with minute glands, 6–7 mm. in length; leaves on vigorous shoots oval to slightly obovate, long-pointed and acuminate at the apex, thicker, more coarsely serrate, 5–6 cm. long and 2.5–3 cm. wide. Flowers 1.2–1.4 cm. in diameter, on long slender slightly villose pedicels, in lax hairy mostly 10–15-flowered corymbs, the lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, covered below with long white hairs, glabrous above, the lobes slender, acuminate and rose-colored at the apex, minutely dentate, glabrous on the outer, slightly villose on the inner surface, reflexed after anthesis; stamens 10; anthers pale yellow; styles 2 or 3. Fruit ripening early in October, on slender red slightly hairy pedicels, in few-fruited spreading clusters, short-oblong, full and rounded at the ends, dull red, marked by large pale dots, 1–1.2 cm. long and 9–10 mm. in diameter; calyx prominent, with a deep narrow cavity, and small spreading and reflexed lobes; flesh thin, yellow-green, dry and mealy; nutlets 2 or 3, gradually narrowed and rounded at the ends, ridged on the back, with a high grooved ridge, 6.5–7 mm. long, and 4–4.5 mm. wide.

A tree 5–8 m. high, with a trunk 8–20 cm. in diameter, large horizontal branches forming a wide flat-topped head, and stout slightly zigzag branchlets dull orange-green marked by large pale lenticels and villose when they first appear, becoming light chestnut-brown, lustrous and glabrous in their first season and light red-brown the following year, and armed with numerous slender nearly straight purplish shining spines 3–6 cm. long.

---

\* I have not seen the mature leaves of this species. When I visited the plants with Mr. Bush in October 1907 the old leaves had all disappeared and were replaced by young leaves.

Rocky hills and barrens near Swan, Taney County, *B. F. Bush*, (No. 7 type) May 21 and Sept. 23, 1905, (No. 7 A) Sept. 24, 1905, (No. 7 B) May 22 and Sept. 23, 1905; Chadwick, Christian County, *B. F. Bush*, (No. 1) May 14, 1907.

27. *CRATAEGUS VILLIFLORA* Sargent, *Trees and Shrubs*, ii. 61, t. 128 (1908).

Gravelly banks of streams, Grandin, Carter County, *B. F. Bush*, (No. 11 type) May and October, 1905; limestone hills, Pacific, Franklin County, *J. H. Kellogg*, (No. 3) May 8, 1905, October 1, 1907.

28. *Crataegus permiera*, n. sp.

Glabrous with the exception of the hairs on the young leaves and on the calyx-lobes. Leaves oblong-obovate, usually rounded or acute and often short-pointed at the apex, gradually narrowed and cuneate at the base, and finely serrate above the middle, with straight or incurved glandular teeth; more than half grown when the flowers open about the middle of May and then thin, yellow-green and lustrous above and pale below, and at maturity thin, dark yellow-green and lustrous on the upper surface and pale yellow-green on the lower surface, 3.5–4.5 cm. long and 1.5–2 cm. wide, with thin yellow midribs, and obscure primary veins mostly within the parenchyma; petioles slender, narrowly wing-margined, 4–5 mm. in length. Flowers 1.2–1.3 cm. in diameter, on slender pedicels, in crowded compact mostly 8–10-flowered corymbs, the long slender lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes long, very slender, acuminate, entire or minutely dentate near the middle, sparingly villose on the inner surface, reflexed after anthesis; stamens 10; anthers rose color; styles 2 or 3, surrounded at the base by a narrow ring of white hairs. Fruit ripening the middle of October, on long drooping reddish pedicels, in few-fruited clusters, short-oblong, full and rounded at the ends, green more or less tinged with red, marked by large pale dots, 1–1.2 cm. long and 8–9 mm. in diameter; calyx little enlarged, with a broad shallow cavity, and small spreading and appressed lobes; flesh thin, greenish yellow, dry and mealy; nutlets 2 or 3, oblong, slightly narrowed and rounded at the ends, or when 3 acute at the base, ridged on the back, with a low slightly grooved ridge, 7–8 mm. long, and 4–4.5 mm. wide.

A tree 5–7 m. high, with a trunk 8–12 cm. in diameter, horizontal branches forming a wide flat-topped head, and slender nearly straight branchlets dark orange-brown and marked by large pale lenticels when they first appear, becoming light chestnut-brown and lustrous in their first season and

light gray-brown the following year, and armed with many slender straight or slightly curved purplish spines, 3–4.5 cm. long.

Rocky banks and hillsides near Monteer, Shannon County, *B. F. Bush* (No. 12 type), May 16 and Oct. 7, 1905, (No. 12 A) Oct. 7, 1905; Moark, on the boundary between Butler County and Arkansas, *B. F. Bush* (Nos. 2 A, 2 B, 2 C, 2 D), May and October, 1905; Butler County, *B. F. Bush* (No. 2) May 1 and October 16, 1905.

## 29. *Crataegus rubrifolia*, n. sp.

Glabrous with the exception of the hairs on the young leaves. Leaves short-obovate, acute or rounded at the apex, gradually narrowed to the concave-cuneate entire base, and finely often doubly serrate above the middle, with straight or incurved glandular teeth; when they appear bright red, roughened above by short white hairs and villose on the midribs above and glabrous below, nearly fully grown when the flowers open the end of April and then thin, light yellow-green and glabrous with the exception of a few hairs on the upper side of the midribs, and at maturity thin, yellow-green, lustrous and scabrate on the upper surface, paler on the lower surface, 2.5–3.5 cm. long and 1.5–2 cm. wide, with slender yellow midribs, and thin primary veins mostly within the parenchyma; petioles slender, narrow-wing-margined nearly to the base, villose on the upper side while young, becoming glabrous, 4–6 mm. in length; leaves on vigorous shoots oval to obovate or suborbicular, more coarsely serrate, often 4–5 cm. long and 3.5–4.5 cm. wide. Flowers 1.3–1.4 cm. in diameter, on long slender often red pedicels, in wide mostly 8–12-flowered corymbs, with linear acuminate bracts and bractlets fading brown and mostly deciduous before the flowers open, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes short, wide, acuminate and red at the apex, entire or minutely dentate near the middle, reflexed after anthesis; stamens 10; anthers pale pink; styles 3 or 4, usually 4. Fruit ripening the middle of October, on slender red pedicels, in few-fruited drooping clusters, subglobose, bright orange-red, lustrous, 8–9 mm. in diameter; calyx little enlarged, with a deep narrow cavity, and spreading often deciduous lobes; flesh thin, yellow, dry and mealy; nutlets usually 4, narrowed and rounded at the base, broader and rounded at the apex, ridged on the back, with a low narrow ridge, about 5 mm. long, and 3.5–4 mm. wide.

A tree in moist rich soil often 6–7 m. high, with a trunk sometimes 2.5 dm. in diameter, covered with thin dark scaly bark, with orange-colored inner layers, and slender slightly zigzag branchlets bright green more or less tinged with red

when they first appear, becoming bright chestnut-brown and rather lustrous in their first season and dull red-brown the following year, and armed with few slender straight purple spines 1.5–3 cm. long; or on dry rocky hills a shrub only 2–3 m. tall.

Jasper County; common and generally distributed, *E. J. Palmer*, Prosperity Junction, near Webb City, (No. 29 type) April 14 and October 4, 1907; bottom-lands of small streams south of Webb City, (No. 29 A) April 21, 1907; Joplin, (Nos. 5, 5 A) April 1907, (No. 5 B) April 7 and October 13, 1907; Carl Junction, (No. 4) April 14 and October 13, 1907.

### 30. *Crataegus consueta*, n. sp.

Glabrous with the exception of the hairs on the upper side of the midribs of the young leaves and on the calyx-lobes. Leaves oblong-obovate, rounded or occasionally acute at the apex, gradually narrowed from above the middle to the slender cuneate entire base, and coarsely often doubly serrate above, with straight glandular teeth; nearly fully grown when the flowers open the middle of May and then thin, dark yellow-green, lustrous and slightly hairy on the midribs above and pale below, and at maturity thin, glabrous, dark green and very lustrous on the upper surface, pale yellow-green on the lower surface, 3.5–4 cm. long and 2–2.5 cm. wide, with prominent yellow midribs, and thin prominent primary veins; petioles thin, narrow-wing-margined to below the middle, glabrous, 7–9 mm. in length; leaves on vigorous shoots oval to slightly obovate, rounded or acute and short-pointed at the apex, abruptly concave-cuneate at the base, more coarsely serrate, often 4.5–5 cm. long and 3.5–4 cm. wide, with stouter midribs and petioles, and more prominent primary veins. Flowers about 1.5 cm. in diameter, on very long slender pedicels, in lax drooping mostly 5- or 6-flowered corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes long, slender, acuminate and glandular at the apex, entire or occasionally minutely dentate, slightly pubescent on the inner surface, reflexed after anthesis; stamens 10; anthers rose color; styles 1 to 4. Fruit ripening the end of September, on long slender drooping pedicels, in few-fruited clusters, oval, orange-red, marked by large dark dots, 1–1.2 cm. long and 8–10 mm. in diameter; calyx little enlarged, with a deep narrow cavity, and small slender spreading or incurved persistent lobes; flesh thick, yellow-green, dry and hard; nutlets 1–4, gradually narrowed and rounded at the ends, or when 4 acute at the base, rounded and slightly ridged on the back, with a broad low ridge, 6–7 mm. long, and 3–4 mm. wide.

A tree 6–7 m. high, with a trunk 1–1.5 dm. in diameter, stout erect branches forming a narrow open irregular head,

and slender nearly straight branchlets light orange-brown and marked by numerous pale lenticels when they first appear, becoming light chestnut-brown and lustrous in their first season and darker the following year, and armed with slender straight or slightly curved purplish shining spines 3-4 cm. long.

Rocky hills, and glades, Swan, Taney County, *B. F. Bush*, (No. 6 A type), May 23 and Sept. 24, 1905, (No. 4 A) May 23 and Sept. 24, 1905, (No. 6 A) May 23 and Sept. 24, 1905, (No. 6 B, 6 C and 6 D) May 16, 1907, (No. 22) April 24 and October 7, 1907.

### 31. *Crataegus tenuisepala*, n. sp.

Glabrous with the exception of the hairs on the young leaves. Leaves obovate, rounded or acute and short-pointed at the apex, gradually narrowed and concave-cuneate at the entire base, and coarsely serrate above the middle, with straight or incurved glandular teeth; nearly fully grown when the flowers open at the end of April and then thin, yellow-green, smooth, lustrous and slightly hairy along the midribs above and pale and glabrous below, and at maturity thin, dark bluish green and lustrous on the upper surface, pale bluish green on the lower surface, 3.5-5.5 cm. long and 2.5-4 cm. wide, with slender yellow midribs, and thin prominent primary veins; petioles slender, narrow-wing-margined to the middle, slightly hairy on the upper side while young, soon glabrous, 5-12 mm. in length; leaves on vigorous shoots suborbicular to oval and abruptly short-pointed, and often 5-6 cm. long and broad. Flowers 1.3-1.4 cm. in diameter, on long slender pedicels, in lax mostly 5- or 6-flowered corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes long, very slender, acuminate and rose-colored at the apex, entire or irregularly glandular-dentate, reflexed after anthesis; stamens 15; anthers dark rose color; styles 2-4. Fruit ripening the middle of October, on slender drooping pedicels, in few-fruited clusters, short-oblong, full and rounded at the ends, orange-red, lustrous, marked by large dark dots, 9-10 mm. long and 8-9 mm. in diameter; calyx little enlarged, with a wide shallow cavity, and spreading or appressed usually persistent lobes; flesh thin, yellow, dry and mealy; nutlets usually 3, gradually narrowed and rounded at the ends, ridged on the back, with a broad low deeply grooved ridge, 5-5.5 mm. long, and about 3 mm. wide.

A tree 5-8 m. high, with a tall stem 1.5-2 dm. in diameter, and slender nearly straight branchlets dull chestnut-brown and marked by pale lenticels when they first appear, becoming very lustrous in their first season and dark reddish brown

the following year, and armed with numerous slender straight chestnut-brown spines 2.5–4 cm. long.

Gravelly ridges between swamps, Moark, on the boundary between Butler County and Arkansas, *B. F. Bush*, (No. 5 type) May 1 and October 15, 1905.

### 32. *Crataegus leptophylla*, n. sp.

Glabrous with the exception of the hairs on the upper surface of the young leaves. Leaves oblong-obovate, rounded or acute and often short-pointed at the apex, gradually narrowed to the slender cuneate base, and coarsely often doubly serrate above the middle, with straight or incurved glandular teeth; nearly fully grown when the flowers open in the first week of May and then thin, yellow-green, smooth, lustrous and slightly hairy on the midribs above and paler below, and at maturity thin but firm in texture, dark yellow-green, glabrous and lustrous on the upper surface, pale on the lower surface, 5–7 cm. long and 3–3.5 cm. wide, with prominent yellow midribs, and slender usually prominent primary veins; petioles stout, narrow-wing-margined nearly to the base, often rose color in the autumn, 8–10 mm. in length. Flowers about 1.2 cm. in diameter, on long slender pedicels, in wide mostly 10–15-flowered corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes gradually narrowed from the base, short, broad, acuminate and glandular at the apex, minutely glandular-dentate near the middle, reflexed after anthesis; stamens 20; anthers pink; styles 3–5. Fruit ripening and falling early in October, on long drooping red pedicels, in few-fruited clusters, short-oblong to slightly obovate, rounded at the ends, light orange-red, lustrous, marked by large pale dots, 1–1.2 cm. long and 8–10 mm. in diameter; calyx little enlarged, with a deep narrow cavity, and small spreading lobes; flesh very thin, green and hard; nutlets usually 3 or 4, gradually narrowed and rounded at the ends, ridged on the back, with a broad deeply grooved ridge, 4.5–5 mm. long, and 3–3.5 mm. wide.

A tree sometimes 7 m. high, with a tall trunk 2–2.5 dm. in diameter, covered with light red-brown bark separating into small closely appressed scales, large spreading and ascending branches forming an open irregular round-topped head, and stout slightly zigzag branchlets chestnut-brown and marked by numerous large pale lenticels when they first appear, becoming lustrous and dull reddish brown the following year and ultimately light gray, and armed with numerous slender straight or slightly curved purple shining spines 5–6 cm. long, and persistent, elongated and crowded on old stems and branches.



Low rich soil, Osage, Cole County, *J. H. Kellogg*, (No. 1 type) May 6, 1905, October 7, 1907, (Nos. 4, 5 and 6) May 6, 1905, October 7, 1907.

33. *CRATAEGUS ACUTIFOLIA* Sargent, Bot. Gazette, xxxi. 217 (1901); Silva N. Am. xiii. 51, t. 643; Manual, 375, f. 294.

River des Pères bottoms, Carondelet, St. Louis County.

34. *Crataegus rubrisepala*, n. sp.

Glabrous with the exception of the hairs on the young leaves. Leaves rhombic to oval or slightly obovate, acute at the apex, concave-cuneate at the entire base, and finely often doubly serrate above, with straight glandular teeth; nearly fully grown when the flowers open at the end of April and then thin, yellow-green and slightly hairy along the midribs above and pale and glabrous below, and at maturity thin, yellow-green and lustrous on the upper surface, dull yellow-green on the lower surface, 3-4 cm. long and 2.5-3 cm. wide, with slender yellow midribs, and thin prominent primary veins; petioles slender, narrow-wing-margined nearly to the base, often rose color in the autumn, 5-12 mm. in length; leaves on vigorous shoots oval to obovate, more coarsely serrate, often 5-6 cm. long and 3.5-4 cm. wide. Flowers 1.2-1.4 cm. in diameter, on long slender pedicels, in lax mostly 10-15-flowered corymbs, the much elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes long, slender, acuminate, entire or slightly glandular-dentate near the apex, bright rose color, reflexed after anthesis; stamens 10; anthers pale yellow; styles usually 3, surrounded at the base by a ring of pale tomentum. Fruit ripening the middle of October, on long slender red drooping pedicels, in few-fruited clusters, subglobose to short-oblong, full and rounded at the ends, orange-red, 7-8 mm. in diameter; calyx prominent, with a narrow deep cavity pointed and tomentose in the bottom, and erect and incurved persistent lobes; flesh thin, dry and mealy; nutlets 2 or 3, rounded at the apex, narrowed and acute at the base, rounded and slightly grooved on the back, 5-5.5 mm. long, and about 3 mm. wide.

A shrub 3-4 m. high, with intricately branched stems covered with dark gray scaly bark and forming an irregular round-topped head, and stout zigzag branchlets green more or less tinged with red when they first appear, becoming light chestnut-brown, lustrous and marked by large lenticels in their first season and dull reddish brown the following year, and armed with numerous stout nearly straight dark purple shining spines 3.5-4.5 cm. long.

Thickets on dry rocky hills along Turkey Creek north of Joplin, Jasper County, *E. J. Palmer*, (No. 8 type) April 28 and October 13, 1907.

Mr. Palmer notices that the disks of the flowers in this species turn dark purple-red as the flowers fade, an unusual change of color in this group, although it is common in plants of the Molles and Flabellatae Groups.

### 35. *Crataegus rudis*, n. sp.

Glabrous with the exception of the hairs on the upper side of the young leaves. Leaves oblong-obovate, rounded or rarely acute at the apex, gradually narrowed to the long slender cuneate entire base, very slightly serrate above the middle, with incurved glandular teeth, and thickened and slightly revolute on the margins; nearly fully grown when the flowers open about the 10th of May and then yellow-green, smooth and lustrous and slightly hairy along the midribs and veins above and paler below, and at maturity thin, yellow-green, glabrous and lustrous on the upper surface, pale bluish-green on the lower surface, 4-5 cm. long and 1.5-2 cm. wide, with slender yellow midribs, and very thin primary veins; petioles slender, narrow-wing-margined to below the middle, 4-5 mm. in length; leaves on vigorous shoots acute or rounded and short-pointed at the apex, more coarsely serrate and often 5-7 cm. long and 3-4 cm. wide, with stout midribs and petioles, and more prominent primary veins. Flowers 1.3-1.5 cm. in diameter, on long slender pedicels, in small lax mostly 7- to 12-flowered corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes abruptly narrowed from the base, long, slender, glandular and acuminate at the apex, entire or minutely glandular-dentate below the middle, reflexed after anthesis; stamens 10; anthers pale yellow; styles 1-3, surrounded at the base by a narrow ring of pale tomentum. Fruit ripening and falling early in October, on long slender drooping pedicels, in few-fruited clusters, oval to subglobose, scarlet, slightly pruinose, marked by large dark dots, 1-1.2 cm. long, 9-10 mm. in diameter; calyx little enlarged, with a deep narrow cavity, and small spreading usually deciduous lobes; flesh thin, green, dry and hard; nutlets usually 1 or 2, gradually narrowed and rounded at the ends, ridged on the back, with a broad low grooved ridge, 5-6 mm. long, and 4-4.5 mm. wide, or when 1, 5.5-6 mm in diameter.

A tree 3-8 m. high, with a trunk 7.5-15 cm. in diameter, covered with dark scaly bark, and stout nearly straight branchlets light orange-green and marked by pale lenticels when they first appear, becoming light orange-brown in their first season and light gray and rather lustrous the following year, and armed with very numerous stout or slender

straight or slightly curved purple shining ultimately gray spines 3–6 cm. long.

Woods and the gravelly banks of small streams near Monteer, Shannon County, *B. F. Bush* (No. 2 type), May 11 and Oct. 8, 1905, (No. 2 A) Oct. 5, 1905, April 28, 1907, (No. 2 C) May 12 and Oct. 3, 1905, April 29, 1907, (No. 2 D) May 26, 1907, (No. 2 E) Oct. 7, 1905, (No. 4) May 12 and August 19, 1901, (No. 4 D) August 20, 1901.

36. *CRATAEGUS ERECTA* Sargent, Bot. Gazette, xxxi. 218 (1901); Silva N. Am. xiii. 49, t. 642; Manual, 375, f. 293.

Mississippi River bottoms, East St. Louis to Fish Lake, Illinois.

37. *CRATAEGUS INSIGNIS* Sargent, Trees and Shrubs, i. 107, t. 54 (1903).

Mississippi River bottoms near Cahokia, Illinois, *C. S. Sargent*, *J. B. S. Norton* and *J. H. Kellogg*, (No. 51) 1900-1902; East St. Louis, *J. H. Kellogg*, (No. 2 A) 1902-1904, (No. 14) 1902-1903.

38. *Crataegus setosa*, n. sp.

Leaves oblong-obovate, acuminate and short-pointed or occasionally rounded at the apex, gradually narrowed to the slender entire base, and finely serrate usually only above the middle, with straight or incurved glandular teeth; nearly fully grown when the flowers open during the first week of May and then thin, yellow-green and setose above, and pale and slightly villose along the midribs and veins below, and at maturity thin but firm in texture, yellow-green, smooth and lustrous on the upper surface and paler and nearly glabrous on the lower surface, 3–4 cm. long and 1.5–2.5 cm. wide, with slender yellow midribs, and thin primary veins mostly within the parenchyma; petioles slender, narrow-wing-margined, villose while young, becoming glabrous, 5–6 mm. in length; leaves on vigorous shoots thicker, oval to slightly obovate, abruptly long-pointed, more coarsely serrate and often 4–5 cm. long, with foliaceous falcate glandular-serrate stipules. Flowers 1.2–1.3 cm. in diameter, on slender pedicels covered with long white hairs, in compact slightly hairy mostly 6–8-flowered corymbs, the long slender lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, glabrous, the lobes slender, acuminate, entire or minutely glandular-dentate, glabrous on the outer, sparingly villose on the inner surface, reflexed after anthesis; stamens 10; anthers rose color; styles 2–4. Fruit ripening early in October, on slender drooping glabrous pedicels, in few-fruited clusters, subglobose or slightly longer than broad, crimson, lustrous, marked by large pale dots, 9–10 mm. in

diameter; calyx little enlarged, with a broad shallow cavity, and small spreading and appressed persistent lobes; flesh thin, yellow-green, dry and mealy; nutlets 2-4, full and rounded, or when 4, narrowed at the ends, ridged on the back, with a broad high only slightly grooved ridge, 6.5-7 mm. long, and 3.5-4 mm. wide.

A tree 5-8 m. high, with a trunk 7-15 cm. in diameter, large branches forming a broad round-topped head, and stout nearly straight branchlets purple marked by large pale lenticles and covered with matted white hairs when they first appear, becoming dark red-brown, lustrous and glabrous in their first season and dull gray-brown the following year, and armed with numerous slender nearly straight purplish shining spines 3.5-4.5 cm. long.

Gravelly borders of small streams near Grandin, Carter County, *B. F. Bush* (No. 6 B type), May 8 and Oct. 13, 1905, (No. 6) May 6 and Oct. 11, 1905, (No. 6 A) May 7 and Oct. 11, 1905.

Well distinguished by its small acute leaves setose above while young, its villose corymbs and small subglobose fruits.

### 39. *Crataegus munita*, n. sp.

Leaves oblong-obovate to oval, rounded or acute and sometimes short-pointed at the apex, concave-cuneate at the entire base, and coarsely crenately serrate above the middle; nearly half-grown when the flowers open in the first week of May and then thin, yellow-green, roughened above by short white hairs and villose on the upper side of the midribs and paler and glabrous below, and at maturity thin but firm in texture, dark yellow-green, very lustrous and scabrate or almost smooth on the upper surface, pale bluish green on the lower surface, 3-4 cm. long and 1-2.5 cm. wide, with prominent midribs, and thin prominent primary veins; petioles slender, slightly wing-margined nearly to the base, densely villose while young, becoming glabrous, often rose color in the autumn, 6-7 mm. long; leaves on vigorous shoots oblong-obovate, acuminate, rather thicker, coarsely doubly serrate, usually slightly lobed towards the apex, often 5-6 cm. long and 2.5-4.5 cm. wide, with stout rose-colored midribs, prominent primary veins and broad-winged petioles. Flowers 1.2-1.5 cm. in diameter, on slender densely villose pedicels, in compact mostly 6-8-flowered hairy corymbs, the lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, villose at the base, glabrous above, the lobes long, slender, acuminate and glandular at the apex, glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 10; anthers rose color; styles 1 or 2, rarely 3. Fruit ripening late in October or early in November, on short erect or spreading villose red pedicels, in few-fruited

clusters, subglobose or a little longer than broad, scarlet, more or less pruinose, marked by large pale dots, 8–9 mm. in diameter; calyx prominent, with a short tube, a wide deep cavity, and spreading and incurved mostly persistent lobes; flesh thin, yellow-green, dry and hard; nutlets 1 or 2, acute at the base, rounded and obtuse at the apex, slightly ridged on the back, with a narrow low ridge, 4.5–5 mm. long, and about 2.5 mm. wide, or when 1, 4 mm. in diameter.

A shrub or small tree occasionally 5 m. high but often beginning to flower when less than 1 m. tall, large intricately branched stems, and stout zigzag branchlets dark orange-green and coated with long matted pale hairs when they first appear, becoming light chestnut-brown, lustrous and pubescent in their first season and light gray-brown the following year, and armed with very numerous stout straight or slightly curved purplish shining spines 4–5.5 cm. long.

Dry rocky hillsides near Webb City, Jasper County, *E. J. Palmer*, (No. 17 type) October 13 and November 3, 1901, May 4, 1902, (No. 17 A) November 3, 1901, (No. 17 B) May 4, 1902; Eagle Rock, Barry County, *B. F. Bush*, (No. 86) May 24, 1898.

#### 40. *Crataegus vallicola*, n. sp.

Leaves oblong-obovate, rounded or acute and often short-pointed at the apex, gradually narrowed to the long slender concave-cuneate entire base, and finely serrate above the middle, with straight or incurved glandular teeth; more than half-grown when the flowers open from the 10th to the middle of May and then thin, dark yellow-green, smooth, lustrous and villose along the midribs above and paler and glabrous below, and at maturity thin, dark yellow-green, smooth, lustrous and still slightly hairy on the midribs on the upper surface, pale yellow-green on the lower surface, 4–5 cm. long and 2.5–3 cm. wide, with prominent midribs, and thin conspicuous primary veins; petioles slender, wing-margined nearly to the base, slightly hairy on the upper side, 8–9 mm. in length; leaves on vigorous shoots thicker, with stouter midribs and primary veins, and often 7–8 cm. long and 4–4.5 cm. wide. Flowers 1.4–1.5 cm. in diameter, on long slender slightly villose pedicels, in wide hairy 15–20-flowered corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, glabrous, the lobes gradually narrowed from the base, short, slender, entire or occasionally minutely dentate near the middle, glabrous on the outer, sparingly villose on the inner surface, reflexed after anthesis; stamens 10–15; anthers pale pink; styles 2 or 3, generally 2. Fruit ripening and falling late in September, on slightly hairy pedicels, in few-fruited spreading clusters, short-oblong,

full and rounded at the ends, dull crimson blotched with green, marked by large pale dots, 1.4-1.6 cm. in diameter; calyx little enlarged, with a deep narrow cavity pointed and tomentose in the bottom, and slender spreading and appressed lobes; flesh thin, yellow-green, dry and hard; nutlets usually 2, gradually narrowed and rounded at the ends, often rather broader at the apex than at the base, irregularly ridged on the back, with a low narrow sometimes grooved ridge, 8-8.5 mm. long, and 4.5-5 mm. wide.

A tree 7-8 m. high, with a tall stem sometimes 1.5 dm. in diameter, covered with dark scaly bark, small spreading branches forming an open irregular head, and slender nearly straight branchlets dark reddish brown, marked by large pale lenticels and covered with long scattered white hairs when they first appear, light green and still villose at the end of their first season, dull gray and glabrous the following year, and armed with stout straight or slightly curved dull gray spines 2.5-3 cm. in length, becoming compound, and persistent on old trunks and stems.

Wooded slopes in rich soil near Barrett's Station, St. Louis County, *J. H. Kellogg* (No. 1 type), May 9, 1902, May 8, 1905, May 13 and Sept. 28, 1907.

#### PUNCTATAE.

Leaves obovate to oval or rhombic, cuneate at the base, usually more or less lobed above the middle, thin to subcoriaceous, with prominent veins; petioles short; flowers large, in hairy corymbs; fruit globose to subglobose or rarely obovate, 1.2-5 cm. in diameter.

Anthers rose color; stamens 20.

Leaves rhombic to obovate, acute or rounded at the apex; flowers in mostly 9-12-flowered corymbs.

Flowers 2-2.2 cm. in diameter, in densely villose corymbs; fruit subglobose, flattened at the ends; mature leaves scabrate above.

1. *C. verruculosa*.

Flowers not more than 1.5 cm. in diameter, in slightly villose corymbs; fruit globose to short-oblong, rounded at the ends; mature leaves smooth above.

2. *C. sordida*.

Leaves narrow-obovate, acuminate; flowers not more than 1.2 cm. in diameter, in slightly villose 4-10-flowered corymbs; fruit subglobose, often broader than high; mature leaves smooth above.

3. *C. angustata*.

Anthers yellow.

Stamens 20 (15–20 in No. 6).

Leaves obovate to oval, blue-green; flowers not more than 1.5 cm. in diameter, in densely villose corymbs; fruit subglobose to short oblong, dull red, up to 1.2 cm. in diameter.

4. *C. vicina*.

Leaves obovate, yellow-green.

Leaves thin; flowers not more than 1.2 cm. in diameter, in slightly villose 4–7-flowered corymbs; fruit subglobose to short-oblong, orange-red, 7–9 mm. in diameter.

5. *C. succincta*.

Leaves subcoriaceous; flowers up to 1.8 cm. in diameter, in 8–10-flowered pubescent corymbs; fruit subglobose, bright red, 2–2.5 cm. in diameter.

6. *C. sucida*.

Stamens 15 (10–15 in Nos. 8 & 9).

Leaves rhombic to obovate, acute or acuminate; flowers up to 2 cm. in diameter, in 8–10-flowered corymbs; fruit subglobose to short-oblong.

7. *C. macropoda*.

Leaves obovate to oval; flowers 1.5–1.8 cm. in diameter.

Flowers in 15–20-flowered corymbs; fruit short-oblong; leaves broadly obovate, acute or acuminate at the apex.

8. *C. incaedua*.

Flowers in 5–7-flowered corymbs; fruit subglobose, sometimes broader than high; leaves oblong-obovate, acuminate or rounded at the apex.

9. *C. hertiflora*.

Stamens 10; leaves obovate, yellow-green, scabrate above; flowers 1.5 cm. in diameter, in compact 8–15-flowered corymbs; fruit subglobose to slightly obovate, dull orange-red, pubescent at the ends, 1.5 cm. in diameter.

10. *C. Lettermani*.

Stamens 5–8; leaves oblong-obovate, blue-green, scabrate above; flowers up to 2 cm. in diameter, in 5–8-flowered corymbs; fruit subglobose, 1–1.2 cm. in diameter.

11. *C. secta*.

1. CRATAEGUS VERRUCULOSA Sargent, Manual, 394, f. 313 (1905).

Springfield, Greene County.

2. CRATAEGUS SORDIDA Sargent, Bot. Gazette, xxxiii. 114 (1902); Silva N. Am. xiii. 75, t. 655; Manual, 395, f. 314.

Grandin, Pleasant Grove; and Monteer, Shannon County.

### 3. *Crataegus angustata*, n. sp.

Leaves narrow-obovate, acuminate and occasionally abruptly short-pointed at the apex, gradually narrowed from above the middle to the long slender cuneate entire base, finely serrate above, with straight glandular teeth, and often slightly divided above the middle into 2 or 3 pairs of small lobes; more than half-grown when the flowers open from the 10th to the middle of April and then thin, dark yellow-green and covered above by short white hairs and paler and slightly villose along the midribs and veins below, and at maturity thin but firm in texture, dark yellow-green, smooth and lustrous on the upper surface, paler on the lower surface, 2.5-4 cm. long and 1.5-1.8 cm. wide, with prominent yellow midribs, and thin conspicuous yellow primary veins extending very obliquely toward the end of the leaf. Flowers about 1.2 cm. in diameter, on long slender villose pedicels, in narrow 4-10-flowered corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, pubescent, the lobes slender, acuminate and rose-colored at the apex, glandular-serrate above the middle, villose, reflexed after anthesis; stamens 20; anthers pale rose color; styles 4 or 5. Fruit ripening and falling at the end of September or early in October, on short nearly glabrous drooping pedicels, in few-fruited clusters, subglobose or often rather broader than high, crimson, more or less blotched with green, marked by large pale dots, 1.2-1.4 cm. in diameter; calyx prominent, with a broad deep cavity, and elongated spreading persistent lobes; flesh thick, green, hard and dry; nutlets 4 or 5, gradually narrowed and rounded at the ends, ridged on the back, with a narrow high ridge, 6-6.5 mm. long, and 3.5-4 mm. wide.

A much-branched round-topped shrub 3-5 m. high, with stout stems covered with dark scaly bark, small erect and spreading branches, and slender nearly straight branchlets hoary-tomentose when they first appear, becoming glabrous and light chestnut-brown in their first season and reddish brown the following year, and armed with very numerous slender straight or slightly curved gray spines 3.5-6 cm. long.

Gravelly banks of streams, Swan, Taney County, *B. F. Bush* (No. 1 type), April 20 and October 6, 1907; also (No. 1A) May 21, 1905, (No. 1 B) September 26, 1905, and (No. 1 E) April 22, 1907, all with leaves broader than those of the type and perhaps belonging to another species.

### 4. *Crataegus vicina*, n. sp.

Leaves obovate to oval, acute, acuminate or rounded at the apex, gradually narrowed to the cuneate entire base, slightly often doubly serrate above, with straight glandular teeth, and sometimes slightly lobed above the



middle; not more than a quarter-grown when the flowers open the first of April or late in March and then thin, yellow-green and roughened above by short white hairs and villose below, especially on the midribs and veins, and at maturity thin but firm in texture, dark blue-green, lustrous and smooth above and pale blue-green and more or less villose on the slender yellow midribs, primary veins and reticulate veinlets below, 5-6 cm. long and 3-3.5 cm. wide; petioles slender, narrow-wing-margined often to below the middle, 8-15 mm. in length; leaves on vigorous shoots thicker, broadly obovate, acute or acuminate at the apex, rounded or abruptly cuneate at the base, often 6-7 cm. long and 5 cm. wide. Flowers about 1.5 cm. in diameter, on long stout densely villose pedicels, in wide hairy mostly 7-10-flowered corymbs, the long lower peduncles from the axils of upper leaves; calyx-tube broadly obconic, thickly covered with long matted white hairs, the lobes gradually narrowed from the base, long, slender, acuminate, finely glandular-serrate, villose below and glabrous above on the outer surface, slightly villose on the inner surface, reflexed after anthesis; stamens 20; anthers pale yellow; styles 5. Fruit ripening late in September, on stout spreading hairy pedicels, in few-fruited drooping clusters, subglobose, often a little longer than wide, dull red, marked by conspicuous pale dots, 1-1.2 cm. in diameter; calyx prominent, with a very wide shallow cavity, and spreading often appressed coarsely serrate lobes densely villose on the upper side; flesh thick, yellow, smooth and edible; nutlets 5, thin, gradually narrowed and acute at the ends, rounded and slightly grooved on the back, 6-7 mm. long, and 5-5.5 mm. wide.

A tree 7-8 m. high, with a trunk 2-2.5 dm. in diameter, covered with dark scaly bark, stout spreading and ascending branches forming a wide open head, and stout slightly zigzag branchlets tinged with red, marked by large pale lenticels and villose when they first appear, becoming light orange-brown and lustrous in their first season and lighter reddish brown the following year, and armed with very numerous slender straight or slightly curved purplish shining ultimately dull gray spines 4-6 cm. long, persistent, very numerous and much-branched on old trunks and stems.

Hillsides in rich soil, Neck City, Jasper County, *E. J. Palmer*, (No. 4 type) August 17, 1902, April 15, 1903, (No. 4 A) July 29, 1906, March 31, 1907, (Nos. 4 B and 4 C) March 31, 1907.

##### 5. *Crataegus succincta*, n. sp.

Leaves obovate, acute and short-pointed at the apex, gradually narrowed to the entire base, and finely serrate usually only above the middle, with straight or incurved glandular teeth; when they unfold covered with

short white hairs on the upper surface and hoary-tomentose on the lower surface, about half-grown when the flowers open from the middle to the end of May and then thin, roughened above by short white hairs and sparingly villose below, and at maturity thin but firm in texture, yellow-green, smooth, lustrous and glabrous on the upper surface, paler and nearly glabrous on the lower surface, 3-4 cm. long and 1.3-1.5 cm. wide, with stout yellow midribs, and thin primary veins extending obliquely towards the end of the leaf; petioles slender, narrow-wing-margined to below the middle, tomentose while young, becoming nearly glabrous, 5-6 mm. in length; leaves on vigorous shoots rather thicker, more coarsely serrate, occasionally slightly lobed, 4-5 cm. long and 2.5-3 cm. wide. Flowers 1.2 cm. in diameter, on long slender slightly villose pedicels, in narrow 4-7-, mostly 4- or 5-, flowered corymbs, the long lower peduncle from the axil of the upper leaf; calyx-tube narrowly obconic, covered with short matted pale hairs, the lobes slender, acuminate, finely glandular-serrate, pubescent on the outer, densely villose on the inner surface, reflexed after anthesis; stamens 20; anthers pale yellow; styles 5. Fruit ripening early in October, on long slender slightly hairy drooping pedicels, in few-fruited clusters, subglobose, orange-red, lustrous, 7-9 mm. in diameter; calyx little enlarged, with a wide deep cavity pointed in the bottom, and long spreading and appressed often deciduous lobes; flesh thin, yellow-green, dry and hard; nutlets 5, gradually narrowed and acute at the ends, rounded and slightly grooved on the back, 5-5.5 mm. long, and about 3 mm. wide.

A tree 5 or 6 m. high, with a tall trunk sometimes 6-8 cm. in diameter, covered with dark red-brown bark broken into small closely appressed scales, large branches spreading below and ascending above and forming a broad rather open round-topped symmetrical head, and slender nearly straight branchlets orange-green and covered with pale hairs when they first appear, becoming dull chestnut-red, puberulous and marked by pale lenticels in their first season and reddish brown the following year, and armed with slender straight or slightly curved purple shining spines 4-6 cm. long.

Tops of dry limestone hills, Pacific, Franklin County, *C. S. Sargent*, (No. 6 type) October 1, 1901, *J. H. Kellogg*, May 1, 1902, April 16, 1905; Allenton, St. Louis County, *G. W. Letterman*, May 1883; near St. Louis (without locality), *H. Eggert*, 1886.

The following specimens without floral notes and without fruit probably belong to this species.

Williamsville, Wayne County, *B. F. Bush*, (No 1470) April 29, 1902; Bismarck, St. François County, *J. B. S. Norton*,

April 27, 1902; Doe River to Bismarck, St. François County, *William Trelease* (No. 1270), April 30, 1901; Eureka Springs, Arkansas, *William Trelease*, April 19, 1901.

#### 6. *Crataegus sucida*, n. sp.

Leaves obovate, acute or rounded and short-pointed at the apex, gradually narrowed to the cuneate entire base, finely doubly serrate above, with straight glandular teeth, and slightly divided above the middle into short acute lobes; deeply tinged with red when they unfold; about half-grown when the flowers open at the end of April and then thin, dark yellow-green and slightly roughened above by short white hairs, and paler and hairy on the midribs and veins below, and at maturity subcoriaceous, dark yellow-green, smooth, glabrous and very lustrous on the upper surface, pale and glabrous on the lower surface, 5-6 cm. long and 3.5-4 cm. wide, with stout midribs, and thin primary veins extending very obliquely to the points of the lobes; petioles slender, slightly wing-margined at the apex, covered at first with matted pale hairs, becoming glabrous, often rose color in the autumn, 1-1.5 cm. in length. Flowers 1.5-1.8 cm in diameter, on long slender pubescent pedicels, in wide lax mostly 8-10-flowered corymbs, the long lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, clothed with long appressed white hairs, the lobes slender, acuminate, minutely glandular-serrate, glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 15-20; anthers pale yellow; styles 3-5. Fruit ripening at the end of August, on long drooping stems, in few-fruited clusters, subglobose, bright red, 2-2.5 cm. in diameter; calyx little enlarged, with a broad deep cavity, and small spreading appressed persistent lobes; flesh thick, yellow, soft and edible, nutlets 3-5, gradually narrowed and acute at the ends, rounded and slightly grooved or ridged on the back, with a narrow ridge, 4.5-5 mm. long, and 3.5-4 mm. wide.

A tree 7-8 m. high, with slender nearly straight branchlets covered with matted pale hairs when they first appear, becoming chestnut-brown and puberulous in their first season and light red-brown the following year, and armed with very numerous straight or slightly curved purplish ultimately ashy gray spines 4-8 cm. long.

Near Monteer, Shannon County, *B. F. Bush* (No. 13 A type), May 1, 1902, Oct. 1, 1905, (No. 13) May 1, 1902, May 15 and Oct. 3, 1905, also (Nos. 1449, 1478, 1492, the last with hoary-tomentose pedicels and more hairy leaves).

#### 7. *Crataegus macropoda*, n. sp.

Leaves rhombic to obovate, acute or acuminate at the apex, gradually narrowed to the concave-cuneate entire base, finely often doubly serrate

above, with straight or incurved glandular teeth, and usually very slightly divided above the middle into 2 or 3 pairs of small acute lobes; deeply tinged with red and coated with long white hairs when they unfold, nearly fully grown when the flowers open the end of April and then thin, dark yellow-green and covered above by soft white appressed hairs and villose on the midribs and veins below, and at maturity thin but firm in texture, yellow-green, glabrous, smooth and lustrous on the upper surface, pale and nearly glabrous on the lower surface, 3-4.5 cm. long and 2.5-3 cm. wide, with prominent midribs, and 3 or 4 pairs of thin primary veins extending obliquely to the points of the lobes and deeply impressed on the upper side of the leaf; turning deep orange-red late in the autumn before falling; petioles stout, narrow-wing-margined to below the middle, villose while young, becoming glabrous, 8-10 mm. in length. Flowers 1.8-2 cm. in diameter, on long slender villose pedicels, in narrow crowded mostly 8-10-flowered corymbs, the long lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, thickly covered with appressed white hairs, the lobes narrow, acuminate and rose-colored at the apex, sparingly serrate, with slender glandular teeth, glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 15; anthers pale yellow; styles 3-5, surrounded at the base by a narrow ring of pale tomentum. Fruit ripening the end of October, on very slender drooping pedicels, in usually 4- or 5-fruited clusters, subglobose to short-oblong, full and rounded at the ends, crimson, lustrous, marked by large pale dots, 8-10 mm. in diameter; calyx prominent, with a broad deep cavity wide and tomentose in the bottom, and small spreading and appressed lobes; flesh thin, yellow, dry and hard; nutlets 3-5, gradually narrowed and acute at the ends, slightly ridged on the back, with a narrow low ridge, about 5 mm. long, and 3.5-4 mm. wide.

A small tree, with slender slightly zigzag branchlets dark orange-green and covered with matted pale hairs when they first appear, becoming light chestnut-red, verrucose and marked by pale lenticels in their first season and dull gray-brown the following year, and armed with numerous very slender nearly straight purplish shining spines 4-6 cm. long.

Low moist ground, Olympia Park, Webb City, Jasper County, *E. J. Palmer*, (No. 8 A type) October 13 and 20, 1901, April 29, 1902, *E. J. Palmer* and *C. S. Sargent*, (No. 8) October 2, 1901, *E. J. Palmer*, Oct. 13, 1901; Prosperity Junction near Webb City, *E. J. Palmer*, (No. 8 C) April 29, 1902, (No. 8 D) April 29, 1906; Baker's Branch, three miles south of Webb City, *E. J. Palmer* (Nos. 8 E & 8 F) March 31, 1907; Neck City, Jasper County, *E. J. Palmer*, (No. 3, with

15 stamens), March 31, 1901, August 17, 1902, (Nos. 3 B, 3 C & 3 D) March 31, 1907.

8. *CRATAEGUS INCAEDUA* Sargent, Trees and Shrubs, ii. 3, t. 102 (1907).

Borders of small streams, Monteer, Shannon County, *B. F. Bush* (No. 9 B type), May and October 1905, also (Nos. 501, 510 & 9).

9. *Crataegus hertiflora*, n. sp.

Leaves broadly obovate to oval, acuminate or acute at the apex, gradually narrowed to the concave-cuneate entire base, coarsely often doubly serrate above, with straight glandular teeth, and sometimes slightly divided above the middle into 2 or 3 pairs of small acute lobes; more than half-grown when the flowers open the middle of April and then thin, yellow-green and slightly roughened above by short hairs and below scabrate and villose along the midribs and veins, and at maturity thin but firm in texture, dull dark yellow-green and smooth above, paler yellow-green and slightly villose below on the stout prominent midribs and primary veins, 4-6 cm. long and 3-3.5 cm. wide; petioles stout, wing-margined to the middle, densely villose, 1.5-1.8 cm. in length. Flowers 1.6-1.8 cm. in diameter, on long slender pedicels coated with matted white hairs, in mostly 5-7-flowered hairy corymbs, the lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, hairy like the pedicels, the lobes slender, acuminate, glandular-serrate, villose; stamens 10-15; anthers yellow; styles 4 or 5. Fruit ripening and falling late in September or early in October, on slender slightly villose pedicels, in few-fruited clusters, subglobose, sometimes rather broader than high, crimson, more or less blotched with green, marked by large pale lenticels, 1.5-1.6 cm. in diameter; calyx little enlarged, with a broad deep cavity, and small spreading lobes; flesh thin, pale yellow, sweet and edible; nutlets 4 or 5, gradually narrowed and rounded at the apex, thinner and rounded at the base, ridged on the back, with a broad low slightly grooved ridge, 5.5-6 mm. long and 4-5 mm. wide.

A tree 6-7 m. high, with a trunk sometimes 1.5 dm. in diameter, covered with dark scaly bark broken into short thick plates, stout ascending and spreading light gray branches forming a wide open irregular head, and slender zigzag branchlets light green marked by large pale lenticels and thickly covered with matted pale hairs when they first appear, becoming light chestnut-brown, lustrous and glabrous in their first season and pale reddish brown the following year, and armed with numerous slender

straight or slightly curved dark gray spines 2.5-3 cm. long.

Swan, Taney County, *B. F. Bush*, (No. 8 type) April 20 and October 6, 1907, (No. 8 A) April 21, 1907.

10. *CRATAEGUS LETTERMANI* Sargent, Bot. Gazette, xxxi. 220 (1901); Silva N. Am. xiii. 79, t. 657; Manual, 397, f. 317.

Near Allenton, St. Louis County.

11. *Crataegus secta*, n. sp.

Leaves oblong-obovate, acute or acuminate, gradually narrowed to the concave-cuneate base, finely doubly serrate often to below the middle, with straight glandular teeth, and deeply divided toward the apex into 4 or 5 pairs of narrow acuminate lobes; when they unfold coated with pale hairs more abundant on the upper surface than on the lower surface, about one-third grown when the flowers open the middle of April and then thin, yellow-green, roughened above by short white hairs and villose below, and at maturity thin, scabrate and dull blue-green on the upper surface, pale bluish green and villose on the lower surface especially on the slender yellow midribs, and 4 or 5 pairs of thin prominent primary veins extending very obliquely to the points of the lobes, 5-6 cm. long and 4-4.5 cm. wide; petioles slender, narrowly wing-margined to the middle, covered while young with long white only partly deciduous hairs, 1-1.2 cm. in length; stipules lanceolate to linear-obovate, more or less falcate, glandular-serrate, fading rose color, often persistent until the flowers open. Flowers 1.8-2 cm. in diameter, on long slender drooping villose pedicels, in compact mostly 5-8-flowered hairy corymbs, the lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, thickly coated with long white hairs, the lobes slender, acuminate, coarsely glandular-serrate, glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 5-8; anthers pale yellow; styles 3-5, surrounded at the base by a narrow ring of pale hairs. Fruit ripening in September, on elongated drooping hairy pedicels, in few-fruited clusters, subglobose, crimson, lustrous, marked by many small pale dots, 1-1.2 cm. in diameter; calyx little enlarged, with a deep narrow cavity pointed in the bottom, and small spreading and appressed lobes villose on the upper side; flesh thin, dry and hard; nutlets 3-5, narrowed and rounded, or when 5 acute at the ends, ridged on the back, with a broad high slightly grooved ridge, 5.5-6 mm. long, and about 5 mm. wide.

A tree 4 or 5 m. high, with a short stem covered with dark scaly bark, stout spreading branches armed like the trunk with numerous long dull gray spines, and slender nearly straight branchlets light red-brown and coated for 2 or 3

years with long white hairs, finally becoming ashy gray and glabrous, and armed with slender nearly straight purple spines 5–6 cm. long.

Low moist soil near Carthage, Jasper County, *E. J. Palmer* and *C. S. Sargent*, (No. 6 type) May 11, 1902, *E. J. Palmer*, July 13, 1902, April 14, 1903; hills, Prosperity Junction, near Webb City, Jasper County, *E. J. Palmer* (No. 13) April 28 and September 28, 1902, April 13, 1903, (No. 13 A) April 27, 1902.

### VIRIDES.

Leaves usually thin, usually acute or acuminate at the ends or rarely broad at the base; petioles slender, elongated, mostly eglandular; flowers in usually many-flowered corymbs; stamens 15–20; anthers yellow (color unknown in No. 8); fruit subglobose to short-oblong or obovate.

Fruit not exceeding 7 mm. in diameter.

Corymbs many-flowered.

Fruit scarlet.

Fruit subglobose; leaves ovate to oblong-obovate; bark smooth, gray or pale orange color. 1. *C. viridis*.

Fruit obovate; leaves oval to rhombic; bark dark and scaly. 2. *C. larga*.

Fruit orange or orange-red, subglobose.

Leaves lanceolate.

3. *C. lanceolata*.

Leaves ovate.

4. *C. ovata*.

Corymbs 5–8-flowered; fruit orange-red; leaves oval to obovate.

5. *C. furcata*.

Fruit 1–1.8 cm. long.

Fruit pruinose.

Leaves lanceolate to oblong-obovate, acuminate, coriaceous, dark green, very lustrous; fruit dull brick-red, up to 1.8 cm. in length. 6. *C. nitida*.

Leaves obovate, rounded and short-pointed or acute at the apex, thin, yellow-green; fruit crimson, 1–1.2 cm. in diameter. 7. *C. ludoviciensis*.

Fruit not pruinose.

Fruit subglobose to short-oblong.

Leaves obovate to oval or rhombic, narrowed at the base; fruit crimson; corymbs glabrous. 8. *C. mitis*.

Leaves ovate, rounded or truncate at the broad base, fruit dark red; corymbs slightly villose.

9. *C. atrorubens*.

Fruit obovate; leaves ovate to oval; corymbs slightly villose; fruit orange-red. 10. *C. Dawsoniana*.

1. *CRATAEGUS VIRIDIS* Linnaeus, Spec. 476 (1753).—Sargent, Silva N. Am. iv. 109, t. 187; Manual, 401, f. 320.—Beadle in Small, Fl. Southeastern U. S. 540.—Britton, Manual, 520.

*Crataegus arborescens*, Elliott, Sk. i. 550 (1821).—Torrey & Gray, Fl. N. Am. i. 466.—Nuttall, Silva, ii. 10, t. 45.—Chapman, Fl. 127.

Des Pères River bottoms, Carondelet, St. Louis County, *J. H. Kellogg*; Fenton, *J. H. Kellogg* (Nos. 1 & 2), April 29, 1905, (No. 5) Oct. 1907; Gasconade, Gasconade County, *J. H. Kellogg*, (No. 1) May 7, 1905; Osage, Cole County, *J. H. Kellogg*, (No. 2) May 6, 1905, (No. 8) October 1, 1907; Campbell, Dunklin County, *B. F. Bush* (No. 296); Butler County (without locality) *B. F. Bush* (No. 3); Moark, (No. 3 A) *B. F. Bush*; Mississippi River bottoms, Illinois, very common; also south through Arkansas to eastern Texas and through the Gulf States to Florida and Virginia.

## 2. *Crataegus larga*, n. sp.

Glabrous with the exception of the hairs on the young leaves and their petioles. Leaves ovate to oval, rhombic or rarely obovate, acuminate at the ends, and finely serrate, with incurved glandular teeth; nearly fully grown when the flowers open in the first week of May and then thin, yellow-green, lustrous and slightly hairy on the midribs above and paler and furnished with small tufts of axillary hairs below, and at maturity thin but firm in texture, dark yellow-green, smooth, lustrous and glabrous above, paler yellow-green and still slightly hairy below, 4–6 cm. long and 2–3.5 cm. wide, with prominent yellow midribs, and thin primary veins; petioles slender, slightly wing-margined at the apex, sparingly villose while young, soon becoming glabrous, often rose color in the autumn, 1–1.5 cm. in length; leaves on vigorous shoots ovate, acuminate, rounded or abruptly cuneate at the base, coarsely serrate, sometimes deeply lobed by narrow sinuses, often 7–9 cm. long and 6–7 cm. wide, with stout winged petioles and foliaceous lunate coarsely serrate persistent stipules. Flowers 1.2 cm. in diameter, on long slender pedicels, in wide lax mostly 15–20-flowered crowded corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes gradually narrowed from the base, short, wide, acuminate and glandular at the apex, entire or occasionally minutely dentate, reflexed after anthesis; stamens 20; anthers pale yellow; styles 3–5, usually 5. Fruit ripening the middle of October, on long slender drooping pedicels, in wide many-fruited clusters, obovate, full and rounded at the apex, gradually narrowed at the base, scarlet, lustrous, marked by small pale dots, 6–7 mm. long and 7–8 mm. in diameter; calyx little enlarged, with a deep narrow cavity, and small



spreading and reflexed lobes; flesh thin, yellow, dry and mealy; nutlets 3-5, gradually narrowed and rounded at the apex, acute at the base, about 3 mm. long, and 2.5 mm. wide.

A tree 8 or 9 m. high, with a trunk often 2.5 dm. in diameter, covered with dark scaly bark, small ascending branches forming a narrow oblong head, and stout nearly straight branchlets dark orange-green and marked by pale lenticels when they first appear, becoming bright chestnut-brown and lustrous in their first season and dull red-brown the following year, and armed with slender straight chestnut-brown spines 1.5-4 cm. long, and persistent, very numerous and compound on old stems.

Roadside on the banks of Cahokia Creek, north of Cahokia, Illinois, *J. H. Kellogg*, (X type), May 7, 1903, August 2, 1902, October 18, 1905.

3. *CRATAEGUS LANCEOLATA* Sargent, *Trees and Shrubs*, ii. 65, t. 130 (1908).

River des Pères bottoms, Carondelet, St. Louis County, *J. H. Kellogg* (No. 4 type), May and November 1902, May 1905, (No. 1) May and October 1903 and 1906.

4. *CRATAEGUS OVATA* Sargent, *Manual*, 402, f. 321 (1905).

River des Pères bottoms, Carondelet, St. Louis County, *J. H. Kellogg*.

5. *Crataegus furcata*, n. sp.

Glabrous with the exception of the hairs on the young leaves and petioles and on the calyx-lobes. Leaves oval to slightly obovate, acute and short-pointed, acuminate or rounded at the apex, gradually narrowed to the concave-cuneate entire base, and coarsely serrate above the middle, with straight or incurved glandular teeth; when they unfold deeply tinged with red and covered above by short white hairs and glabrous below with the exception of small axillary tufts and of a few hairs along the midribs, nearly fully grown when the flowers open in the first week of May and then thin, yellow-green, smooth, lustrous and glabrous above, and at maturity thin but firm in texture, dark yellow-green, glabrous and very lustrous on the upper surface, paler and still sparingly villose on the lower surface on the prominent rose-colored midribs and slender obscure primary veins, 4-5 cm. long and 1.5-2.5 cm. wide; petioles slender, slightly wing-margined at the apex, villose on the upper side while young, becoming glabrous, rose-colored in the autumn, 6-12 mm. in length; leaves on vigorous shoots thicker, ovate, acuminate and long-pointed at

the apex, cuneate at the base, coarsely serrate, frequently 3-lobed by broad sinuses, the terminal lobe divided into 2 or 3 short lateral lobes, often 5-6 cm. long and 4-5 cm. wide, with stout winged petioles, and linear glandular caducous stipules. Flowers 1.2-1.4 cm. in diameter, on long slender pedicels, in mostly 5-8-flowered corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes gradually narrowed from the base, short, broad, acuminate and glandular at the apex, entire or minutely dentate, glabrous on the outer, very sparingly villose on the inner surface, reflexed after anthesis; stamens 20; anthers pale yellow; styles 3 or 4. Fruit ripening late in October, on slender drooping pedicels, in few-fruited clusters, subglobose to short-oblong, orange-red, lustrous, 7-8 mm. in diameter; calyx little enlarged, with a wide deep cavity, and small erect and incurved often deciduous lobes; flesh thin, yellow, dry and hard; nutlets 3 or 4, gradually narrowed and rounded at the ends, slightly ridged or rounded and grooved on the back, 4.5-5 mm. long, and about 3 mm. wide.

A shrub 5-7 m. high, with numerous large spreading stems covered with dark orange-colored smooth bark, small spreading branches forming a very broad round-topped rather open head, and slender zigzag branchlets light orange-green more or less tinged with red when they first appear, becoming light chestnut-brown, lustrous and marked by pale lenticels in their first season and dull gray-brown the following year, and armed with numerous slender straight or slightly curved light chestnut-brown spines 2.5-6 cm. long.

Rocky hillsides, and near small streams in rich soil, Prosperity Junction near Webb City, Jasper County, *E. J. Palmer* (No. 6 type) May 19 and October 27, 1901, May 8, 1902, (No. 7, with 15-20 stamens, also No. 550) *B. F. Bush*, May 19, 1901, *E. J. Palmer* and *C. S. Sargent*, October 2, 1901, *E. J. Palmer*, October 7, 1901, May 8, 1902, (No. 7 A) *E. J. Palmer*, May 4 and Oct. 20, 1902, (No. 7 D) *E. J. Palmer*, April 14, 1907; Neck City, Jasper County, *E. J. Palmer*, (No. 7) April 28, 1907.

6. *CRATAEGUS NITIDA* Sargent, Bot. Gazette, xxxi. 231 (1901); Silva N. Am. xiii. 179, t. 703; Manual, 406, f. 325.—Britton, Manual, 520.

*Crataegus viridis* Sargent, Silva N. Am. iv. 109 (in part) (not Linnaeus) (1892).

*Crataegus viridis* var. *nitida* Britton and Brown, Ill. Fl. ii. 242 (1897).

Mississippi River bottoms, East St. Louis, Illinois, common.

7. *CRATAEGUS LUDOVICIENSIS* Sargent, Trees and Shrubs, ii. 5, t. 103 (1907).

Des Pères River bottoms, Carondelet, St. Louis County, *J. H. Kellogg*, (No. 7) 1902-1905.

8. *CRATAEGUS MITIS* Sargent, Manual, 407, f. 326 (1905).

Mississippi River bottoms at Cahokia, below East St. Louis, Illinois, *J. H. Kellogg*.

9. *CRATAEGUS ATRORUBENS* Ashe, Jour. Elisha Mitchell Sci. Soc. xvi. pt. ii. 78 (1900).—Sargent, Silva N. Am. xiii. 181, t. 704; Manual, 408, f. 327.

Mississippi River bottoms, East St. Louis, Illinois.

10. *Crataegus Dawsoniana*, n. sp.

Leaves ovate to oval, acuminate, gradually or abruptly narrowed and concave-cuneate at the entire base, sharply often doubly serrate above, with straight glandular teeth, and occasionally slightly 3-lobed at the apex; about half-grown when the flowers open late in May or early in June and then very thin, yellow-green, sparingly hairy on the midribs above and villose on the midribs and primary veins and in their axils below, and at maturity thin, dark yellow-green and glabrous above, paler and still slightly hairy below on the stout rose-colored midribs and slender primary veins, 4-6 cm. long and 3-4 cm. wide; petioles slender, slightly wing-margined at the apex, villose during the season, 1-1.5 cm. in length; stipules linear-obovate, falcate, minutely glandular-dentate, green, deciduous; leaves on vigorous shoots ovate, rounded or abruptly cuneate at the broad base, more coarsely serrate, laterally lobed, with broad acute lobes, often 7-8 cm. long and 6-7 cm. wide, with foliaceous lunate coarsely glandular-serrate persistent stipules. Flowers 1.4-1.5 cm. in diameter, on long slender slightly hairy pedicels, in wide mostly 10-15-flowered corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, covered with matted pale hairs, the lobes gradually narrowed from the base, acute, finely glandular-serrate, glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 20; anthers pale yellow; styles 4 or 5. Fruit ripening in October and remaining on the branches during the winter, on long slender nearly glabrous red pedicels, in many-fruited drooping clusters, obovate, full and rounded at the apex, gradually narrowed at the base, orange-red, lustrous, marked by occasional dark dots, 1-1.2 cm. long and 8-10 mm. in diameter; calyx little enlarged, with a wide shallow cavity, and small spreading lobes dark red on the upper side below the middle; flesh thick, yellow, dry and mealy; nutlets 4 or 5, acute at the base, narrowed and rounded at the apex, rounded and only slightly grooved on the back, 4.5-5 mm. long, and 3-3.5 mm. wide.

A small tree, with a trunk covered with pale scaly bark, spreading branches forming a wide irregular head, and slender branchlets orange-green more or less tinged with red and slightly hairy when they first appear, becoming dark chestnut-brown, lustrous and marked by pale lenticels in their first season and dull red-brown the following year, and unarmed or armed with occasional short stout spines.

This plant was raised at the Arnold Arboretum from seeds collected in 1883 by Mr. G. W. Letterman at East St. Louis, Illinois. The trees from which this seed was gathered have not been seen in recent years and they have probably been destroyed in the rapid spread of the city over the Mississippi bottoms.

I take much pleasure in associating with this handsome and distinct tree the name of Mr. Jackson Dawson, the Superintendent of the Arnold Arboretum, the skilful and successful propagator who has raised more forms of *Crataegus* than any man of his time.

#### PRUINOSAE.

Leaves generally broad at the base; petioles long, usually slender; flowers large; fruit subglobose to short-oblong, ovate or obovate, often broader than high, frequently angled, red or green, more or less pruinose, 1-2.2 cm. in diameter, late-ripening, the mature calyx-lobes often raised on a short tube; nutlets 3-5.

Stamens 20.

Anthers rose color or pink.

Mature leaves smooth on the upper surface (sometimes scabrate in No. 1); fruit broader than high.

Leaves blue-green.

Flowers on stout pedicels; anthers rose color; fruit crimson; leaves villose below on the midribs and veins early in the season. 1. *C. bracteata*.

Flowers on slender pedicels; anthers pink; fruit green faintly tinged with red; leaves nearly glabrous early in the season. 2. *C. rubicundula*.

Leaves yellow-green.

Leaves setose above early in the season, thin; anthers bright red; fruit deep orange-red, slightly or not at all pruinose. 3. *C. platycarpa*.

Leaves smooth above early in the season, thick; anthers pale pink; fruit pink, very pruinose.

4. *C. calliantha*.

Mature leaves scabrate on the upper surface.

Flowers on glabrous pedicels, in glabrous corymbs; calyx-lobes villose on the inner surface; anthers faintly tinged with rose color; fruit broader than high.

5. *C. decorata*.

Flowers on villose pedicels, in slightly hairy corymbs; calyx-lobes glabrous; anthers rose color; fruit short-oblong.

6. *C. aspera*.

Anthers yellow or white; mature leaves smooth above.

Leaves blue-green.

Leaves very thin.

Leaves broadly ovate, mostly rounded at the base; fruit ovate, angled below the middle; calyx-cavity broad and shallow.

7. *C. magnifolia*.  
Leaves ovate, cuneate or rarely rounded at the base; fruit short-oblong to slightly obovate, not angled; calyx-cavity broad and deep.

8. *C. patrum*.

Leaves thick; fruit subglobose; calyx-cavity broad and deep.

9. *C. aperta*.

Leaves yellow-green.

Leaves and pedicels glabrous; fruit broader than high, truncate at the base, 5-angled, up to 2.2 cm. in diameter, scarlet.

10. *C. callicarpa*.

Leaves hairy above early in the season; pedicels slightly villose; fruit subglobose, not angled, not more than 1.4 cm. in diameter, dull green tinged with red.

11. *C. locuples*.

Color of anthers unknown; leaves blue-green, glabrous; fruit subglobose to short-oblong, sometimes angled, green, finally becoming red.

12. *C. Mackenzii*.

Stamens 10.

Anthers rose color or pink.

Leaves dark blue-green; anthers rose color.

13. *C. disjuncta*.

Leaves light yellow-green; anthers pale pink.

14. *C. rigida*.

Anthers yellow

Leaves ovate, blue-green; pedicels and calyx-lobes glabrous; fruit subglobose, green, finally becoming dull red.

15. *C. brachypoda*.

Leaves rhombic to ovate, dark yellow-green; pedicels and inner surface of the calyx-lobes villose; fruit subglobose to short-oblong, on hairy pedicels, green, becoming orange-yellow.

16. *C. sicca*.

**1. *Crataegus bracteata*, n. sp.**

Glabrous with the exception of the hairs on the young leaves and calyx-lobes. Leaves ovate, acuminate, rounded, abruptly concave-cuneate or cordate at the entire base, finely doubly serrate above, with straight or incurved glandular teeth, and slightly divided into 3 or 4 pairs of small acuminate spreading lobes; more than half-grown when the flowers open the first of May and then thin, yellow-green, slightly roughened above by short white hairs, and villose below at the base of the midribs and primary veins, and at maturity thin, dull blue-green and scabrate or smooth on the upper surface, pale bluish green and glabrous on the lower surface, 6-8 cm. long and 3-6 cm. wide, with slender midribs, and thin primary veins arching obliquely to the points of the lobes; petioles slender, slightly wing-margined at the apex, occasionally glandular, often rose color in the autumn, 2.5-5 cm. in length; leaves on vigorous shoots subcoriaceous, cordate or rounded at the base, 6-7 cm. long and 5.5-6.5 cm. wide. Flowers 2-2.2 cm. in diameter, on long stout pedicels, in compact mostly 5- or 6-flowered corymbs, with large foliaceous glandular bracts and bractlets persistent until the flowers open, the lower peduncles from the axils of upper leaves; calyx-tube broadly obconic, the lobes gradually narrowed from wide bases, acuminate, minutely glandular-serrate, glabrous on the outer, slightly pubescent on the inner surface, reflexed after anthesis; stamens 20; anthers rose color; styles 3-5, surrounded at the base by a narrow ring of pale tomentum. Fruit ripening early in November, on long drooping or spreading pedicels, in usually 1- or 2-fruited clusters, subglobose but often rather broader than high, crimson, slightly pruinose, becoming lustrous, marked by small pale dots, 1.2-1.4 cm. in diameter; calyx prominent, with a broad deep cavity, and small spreading or incurved persistent lobes; flesh thick, yellow-green, dry and hard; nutlets 3-5, narrowed and acute at the ends, or when 3 rounded at the base, irregularly ridged on the back, with a narrow ridge, 5-5.5 cm. long, and 4-4.5 mm. wide.

A shrub 2-3 m. high, with numerous erect stems, and slender zigzag branchlets light yellow-green when they first appear, becoming light chestnut-red, lustrous and marked by small pale lenticels in their first season and orange color and lustrous in their second year, and armed with very numerous stout or slightly curved purple shining spines 5-6.5 cm. long.

Jasper County; bottom-lands of Baker's Branch, two miles south of Webb City, *E. J. Palmer* and *C. S. Sargent* (No. 16 type), Oct. 2, 1901, *E. J. Palmer*, November 3, 1901, and May 4, 1904, bottoms of Turkey Creek, *E. J. Palmer*, (No. 16A) Nov. 3, 1901, May 4, 1902, Upper Turkey Creek (Nos. 16 B and 16 C), November 1901.

2. *CRATAEGUS RUBICUNDULA* Sargent, Trees and Shrubs, ii. 7, t. 104 (1907).

River des Pères bottoms, Carondelet, St. Louis County, *H. Eggert*, 1886, *J. H. Kellogg* (No. 9 type) 1902, 1903.

3. *Crataegus platycarpa*, n. sp.

Leaves ovate, acuminate, abruptly concave-cuneate or rounded at the entire base, sharply doubly serrate above, with straight glandular teeth, and divided into 4 or 5 pairs of small acuminate spreading lobes; about half-grown when the flowers open at the end of April and then thin, yellow-green and setose above and pale and furnished below with small axillary tufts of white hairs, and at maturity thin, dark yellow-green, glabrous, smooth and lustrous on the upper surface, paler and nearly glabrous on the lower surface, 5-5.5 cm. long and 4-4.5 cm. wide, with slender midribs, and thin primary veins arching obliquely to the points of the lobes; petioles slender, narrow-wing-margined at the apex, slightly villose while young, becoming glabrous, sparingly glandular, with usually deciduous glands, 1.5-3 cm. in length; leaves on vigorous shoots usually rounded or truncate at the broad base, more coarsely serrate and more deeply lobed, 6-7 cm. long, and nearly as wide. Flowers 2-2.2 cm. in diameter, on short glabrous pedicels, in small compact usually 4- or 5-flowered corymbs, with linear-obovate to linear glandular-serrate bracts and bractlets fading rose color and often persistent until the flowers open, the short lowest peduncle from the axil of the upper leaf; calyx-tube broadly obconic, glabrous, the lobes wide, acuminate, entire or occasionally minutely dentate, glabrous, reflexed after anthesis; stamens 20; anthers large, bright red; styles 3-5, surrounded at the base by a narrow ring of pale tomentum. Fruit ripening the middle of October, on short stems, in 1-3-fruited clusters, depressed-globose, broader than high, somewhat angled at the base, deep orange-red, 1.1-3 cm. in diameter; calyx prominent, with a broad shallow cavity, and small spreading or incurved persistent lobes; flesh thick, yellow, becoming soft and succulent; nutlets 3-5, acute at the base, broader and rounded at the apex, irregularly ridged on the back, with a high narrow ridge, about 6 mm. long, and 5 mm. wide.

A tree 5-7 m. high, with a trunk 5-12 cm. in diameter, small branches, and slender nearly straight glabrous branchlets light green tinged with red when they first appear, becoming light chestnut-brown, lustrous, and marked by small pale lenticels in their first season and ashy gray the following year, and armed with numerous stout slightly curved purple shining spines 3.5-5 cm. long.

Dry ridges between swamps, Moark, on the boundary between Butler County and Arkansas, *B. F. Bush* (No. 4 type), May 1 and Oct. 15, 1905.

#### 4. *Crataegus calliantha*, n. sp.

Glabrous with the exception of the hairs on the young leaves. Leaves ovate, acuminate, rounded or subcordate at the broad entire base, sharply often doubly serrate above, with straight glandular teeth, and slightly divided usually only above the middle into 3 or 4 pairs of small acuminate spreading lobes; about half-grown when the flowers open in the last week of April and then thin, dark yellow-green, smooth, lustrous and slightly hairy on the upper side of the midribs and pale bluish green below, and at maturity thick, yellow-green, smooth and lustrous on the upper surface, paler on the lower surface, 4-5 cm. long and 3-3.5 cm. wide, with slender midribs, and thin primary veins arching obliquely to the points of the lobes; petioles slender, slightly wing-margined at the apex, sparingly villose on the upper side while young, soon glabrous, occasionally glandular, with minute mostly deciduous glands, 2-2.5 cm. in length; leaves on vigorous shoots broadly ovate, rounded or cordate at the base, often 6-7 cm. long and 6-6.5 cm. wide, with stout rose-colored midribs and more prominent veins. Flowers 2.2-2.5 cm. in diameter, on slender pedicels, in compact mostly 5-7-flowered corymbs, with conspicuous oblong-obovate to linear glandular dark rose-colored bracts and bractlets persistent until the flowers open, the long lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes gradually narrowed from the base, long, broad, acuminate, coarsely glandular-serrate near the middle, reflexed after anthesis; stamens 20; anthers pale pink; styles 2-4, surrounded at the base by a broad ring of pale tomentum. Fruit broader than high, angled, pink, very pruinose, about 1 cm. in diameter; calyx prominent, with a short tube, a broad deep cavity wide and tomentose in the bottom, and small spreading lobes; flesh thin, pale yellow, dry and mealy; nutlets usually 4, gradually narrowed and rounded at the ends, ridged on the back, with a broad low slightly grooved ridge, 6-7.5 mm. long, and 4-4.5 mm. wide.

A shrub 1-1.5 dm. high, with small erect stems covered with dark rough bark, and slender nearly straight branchlets dark orange-green when they first appear, becoming light orange-brown very lustrous and marked by numerous small pale lenticels in their first season and dark chestnut-brown and lustrous the following year, and armed with numerous stout nearly straight dark chestnut-brown shining spines 3-4 cm. long.

Limestone hills, Allenton, St. Louis County, and Pacific, Franklin County, common; Sweeney's Hill, Allenton, *J. H. Kellogg* (no number, flowers), April 25, 1905; Pacific, *J. H. Kellogg*, (No. 100, fruit), September 29, 1907.



**5. *Crataegus decorata*, n. sp.**

Leaves obovate, acuminate, rounded or abruptly cuneate at the broad entire base, doubly serrate above, with long straight glandular teeth, and divided into 4 or 5 pairs of short broad spreading lateral lobes; nearly fully grown when the flowers open about the 20th of April and then thin, yellow-green and setose above and pale and villose along the midribs and veins below, and at maturity thin, light yellow-green and scabrate on the upper surface, pale bluish green and villose, with long white hairs on the stout rose-colored midribs and slender primary veins on the lower surface, 4-5 cm. long, and 3-4 cm. wide; petioles slender, slightly wing-margined at the apex, sparingly villose, rose-colored at the base late in the season, 1.8-2 cm. in length. Flowers 1.8-2 cm. in diameter, on long slender glabrous pedicels, in lax mostly 6-10-flowered glabrous corymbs, the lower peduncles from the axils of upper leaves; calyx-tube broadly obconic, bright green, glabrous, the lobes broad, short, acuminate and glandular at the apex, finely glandular-serrate, glabrous on the outer, sparingly villose on the inner surface, reflexed after anthesis; stamens 20; anthers faintly tinged with rose color; styles 3 or 4, surrounded at the base by a narrow ring of pale tomentum. Fruit on short slender drooping pedicels, in few-fruited clusters, broader than high, slightly 5-angled, dull red, marked by large dark dots, 1.3-1.5 cm. wide, 1-1.2 cm. high; calyx little enlarged, with a short tube, a wide deep cavity, and small spreading lobes; flesh thick, pink, dry and hard; nutlets 3 or 4, narrowed and rounded at the ends, irregularly ridged on the back, with a broad narrow ridge, 4.5-5 mm. long, and 4 mm. wide.

A much-branched shrub 3-4 m. high, with numerous small stems, and slender nearly straight glabrous branchlets dark green tinged with red when they first appear, becoming dull light chestnut-brown in their first season and gray tinged with red the following year, and armed with slender straight or slightly curved chestnut-brown spines 5-6 cm. long.

Rocky hillsides, Swan, Taney County, *B. F. Bush* (No. 18 type) April 21 and October 7, 1907, (No. 18 C) April 24, 1907.

**6. *CRATAEGUS ASPERA* Sargent, *Trees and Shrubs*, ii. 67, t. 131 (1908).**

Near Webb City, Jasper County, *E. J. Palmer*, (No. 15 type) November 3, 1901, May and October, 1902.

**7. *CRATAEGUS MAGNIFOLIA* Sargent, *Trees and Shrubs*, ii. 69, t. 132 (1908).**

Near Webb City, Jasper County, *E. J. Palmer*, (No. 26 type) April 30 and September 25, 1905.

### 8. *Crataegus patrum*, n. sp.

Glabrous with the exception of the hairs on the young leaves. Leaves ovate, acuminate, usually cuneate or rarely rounded at the frequently unsymmetrical base, coarsely often doubly serrate above, with straight glandular teeth, and slightly divided into 5 or 6 pairs of small acuminate spreading lobes; more than half-grown when the flowers open about the 1st of May and then thin, yellow-green, smooth, lustrous and furnished with occasional white hairs on the midribs above and pale bluish green below, and at maturity very thin, dark blue-green, smooth and lustrous on the upper surface, paler bluish green on the lower surface, 5-6 cm. long and 4-4.5 cm. wide, with stout yellow midribs, and thin primary veins arching obliquely to the points of the lobes; petioles slender, slightly wing-margined at the apex, glandular, with minute often persistent glands, 2.5-3 cm. in length; leaves on vigorous shoots thicker, ovate, rounded, subcordate, or abruptly cuneate at the wide base, more coarsely serrate, more deeply lobed, 6-8 cm. long and nearly as broad, with long glandular petioles. Flowers 2-2.2 cm. in diameter, on slender glabrous pedicels, in compact mostly 6-10-flowered corymbs, with small glandular rose-colored bracts and bractlets mostly deciduous before the flowers open, the long lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes gradually narrowed from the base, short, wide, minutely glandular-dentate usually only near the middle, reflexed after anthesis; stamens 20; anthers pale yellow; styles 3-5. Fruit ripening the middle of October, on stout spreading or drooping pedicels, in few-fruited clusters, short-oblong or slightly obovate, full and rounded at the ends, dull green, pruinose, marked by large dark dots; calyx little enlarged, with a short tube, a deep wide cavity, and spreading and sometimes slightly incurved lobes, their tips often deciduous from the ripe fruit; flesh thick, green, dry and hard; nutlets usually 3 or 4, gradually narrowed at the ends, acute at the apex, rounded at the base, slightly ridged on the back, about 6 mm. long, and 4-4.5 mm. wide.

A tree sometimes 7 or 8 m. high, with a tall trunk 7-10 cm. in diameter, covered with dark bark broken into closely appressed scales, small spreading erect branches forming an open irregular head, and slender nearly straight or zigzag branchlets dark orange-green more or less tinged with red and marked by pale lenticels when they first appear, becoming light chestnut-brown and very lustrous in their first season and dull red-brown the following year, and armed with slender straight or curved purplish shining spines 2-3.5 cm. long.

River des Pères bottoms, Carondelet, St. Louis County, *H. Eggert*, May 9, 1887, *C. S. Sargent*, September 26, 1900, *J. H. Kellogg* (No. 9 A type), May 7, 1903, May 3 and October

15, 1905, September 28, 1907, (No. 9 B) May 7, 1903, October 15, 1905.

### 9. *Crataegus aperta*, n. sp.

Glabrous. Leaves broadly ovate, acuminate, rounded, truncate or rarely abruptly cuneate at the wide base, finely doubly serrate, with straight glandular teeth, and divided into 3 or 4 pairs of small acuminate lobes; deep bronze color when they unfold, more than half-grown when the flowers open about the 20th of April, and then thin, light yellow-green above and pale bluish green below, and at maturity thin, blue-green, smooth and lustrous on the upper surface, lighter bluish green on the lower surface, 4-7 cm. long and 4.5-5 cm. wide, with stout midribs, and slender primary veins. Flowers 1.8-2 cm. in diameter, on long slender pedicels, in small compact mostly 5-7-flowered corymbs, with conspicuous obovate to linear glandular bracts and bractlets fading rose color and often persistent until after the flowers open, the lower peduncles from the axils of upper leaves; calyx-tube broadly obconic, the lobes gradually narrowed from wide bases, short, minutely glandular-dentate near the middle, reflexed after anthesis; stamens 20; anthers light yellow; styles 3-5. Fruit ripening in October, on stout spreading pedicels, in few-fruited clusters, subglobose, dull green slightly tinged with red, about 1 cm. in diameter; calyx prominent, without a tube, with a broad deep cavity tomentose in the bottom, and small spreading lobes; flesh green, hard and dry; nutlets 3-5, rounded at the base, narrowed and rounded or acute at the apex, irregularly ridged on the back, with a high narrow ridge 6-6.5 mm. long, and 4-4.5 mm. wide.

A narrow shrub sometimes 5 m. high, with small stems, erect branches, and slender nearly straight branchlets dark green tinged with red when they first appear, becoming dark chestnut-brown in their first season and dull grayish brown the following year, and armed with slender straight or slightly curved purple ultimately ashy gray spines 3-5 cm. long.

Rocky Hills, Swan, Taney County, *B. F. Bush*, (No. 19 A type) April 22 and October 7, 1907, (Nos. 19, 19 B, 19 C) April 22 and 23, 1907.

### 10. *Crataegus callicarpa*, n. sp.

Glabrous with the exception of the hairs on the young leaves and calyx-lobes. Leaves ovate, acute, cordate at the base, very coarsely often doubly serrate, with long straight glandular teeth, and slightly divided into 3 or 4 pairs of short broad acuminate lateral lobes; not more than a quarter grown when the flowers open late in April and then very thin, yellow-green and slightly hairy above and on the midribs below, and at maturity thin, glabrous, crumpled, dark yellow-green and very lustrous on the upper surface, pale yellow-green on the lower surface, 5.5-6.5 cm. long and

5-6 cm. wide, with stout midribs, and 3 or 4 pairs of prominent primary veins connected by conspicuous cross veinlets; petioles stout, slightly wing-margined at the apex, sparingly glandular, with minute deciduous glands, 2.5-3 cm. in length; leaves on vigorous shoots thicker, with shorter glandular petioles rose-colored towards the base. Flowers about 2.5 cm. in diameter, on short stout pedicels, in small compact mostly 5-10-flowered corymbs, with lanceolate to linear-obovate glandular bracts and bractlets usually persistent until the flowers open, the lower peduncles from the axils of upper leaves; calyx-tube broadly obconic, the lobes separated by wide sinuses, short, broad, acuminate, coarsely glandular-serrate, sparingly villose on the inner surface, reflexed after anthesis; stamens 20; anthers white; styles 5, surrounded at the base by a broad ring of pale tomentum. Fruit ripening early in October, on short stout spreading pedicels, in 2- or 3-fruited clusters, broader than high, distinctly 5-angled, rounded at the wide apex, truncate at the base, with a deep depression at the insertion of the pedicel, scarlet, pruinose, becoming very lustrous, marked by numerous large pale dots, 1.8-2.2 cm. broad and 1.6-1.8 cm. high; calyx without a tube, with a broad deep cavity narrow and tomentose in the bottom, and deciduous lobes; flesh thin, light yellow slightly tinged with red, dry and mealy, with a pleasant flavor; remaining on the ground through the winter without becoming soft; nutlets 5, thin, acute at the apex, rounded at the base, rounded and slightly grooved or ridged on the back, with a low grooved ridge, 5.5-6 mm. long, and 5-5.5 mm. wide.

A tree 6-7 m. high, with a tall trunk 1.2-1.5 dm. in diameter, large ascending and spreading branches, and stout nearly straight branchlets dark orange-green when they first appear, becoming light chestnut-brown, very lustrous and marked by small pale lenticels in their first season and dull red-brown the following year, and armed with occasional straight or slightly curved stout purplish spines 3.5-5 cm. long.

Hillsides, Shrewsbury, St. Louis County, *C. W. Fullgraf* and *J. H. Kellogg*, April 26 and September 30, 1907.

The fruit of this species is the largest and handsomest I have seen on any plant in this group.

#### 11. *Crataegus locuples*, n. sp.

Leaves ovate, acuminate, rounded or subcordate at the broad base, sharply often doubly serrate, with long straight glandular teeth, and divided into 4 or 5 pairs of broad acuminate lateral lobes; deeply tinged with red when they unfold, about one-third grown when the flowers open the middle of April and then thin, yellow-green, roughened above by short white hairs and villose on the midribs and veins below, and at maturity thin, dark yellow-green, glabrous and lustrous on the upper surface, lighter-colored and glabrous on the lower surface with the exception of

occasional hairs on the stout midribs, and prominent primary veins connected by conspicuous cross veinlets, 6-8 cm. long and 5-6.5 cm. wide; petioles stout, slightly wing-margined at the apex, densely villose while young, becoming glabrous, rose color toward the base in the autumn, 2.5-3 cm. in length; leaves on vigorous shoots rather thicker and often 12-14 cm. long and 10-12 cm. wide. Flowers 2-2.2 cm. in diameter, on short slender slightly hairy pedicels, in compact mostly 7-10-flowered corymbs, with large oblong-obovate to linear-obovate glandular bracts and bractlets mostly persistent until the flowers open, the elongated lower peduncles from the axils of upper leaves; calyx-tube broadly obconic, the lobes gradually narrowed from wide bases, short, acute, laciniately glandular-serrate, glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 20; anthers white; styles 3-5, surrounded at the base by a broad ring of pale tomentum. Fruit ripening early in October, on short drooping red glabrous pedicels, in few-fruited clusters, subglobose, dull green tinged with red, 1.2-1.4 cm. in diameter; calyx prominent, with a short tube, a broad shallow cavity tomentose in the bottom, and deciduous lobes; flesh thin, dry and hard; nutlets 3-5, usually 5, narrowed and rounded at the ends, irregularly ridged on the back, with a slightly grooved ridge, 7-7.5 mm. long, and 4-4.5 mm. wide.

A tree 7-8 m. high, with a tall trunk 1-1.5 dm. in diameter, covered with dark scaly bark, large ascending and spreading pale gray branches forming a narrow oblong irregular head, and slender slightly zigzag glabrous branchlets pale green when they first appear, becoming light chestnut-brown, very lustrous and marked by small pale lenticels in their first season and lighter-colored the following year, and armed with occasional stout nearly straight purple shining spines 2-3.5 cm. long.

Wooded hillsides, near Barrett's Station, St. Louis County, *J. H. Kellogg*, (No. 9 A type) May 9, 1902, May 4, 1905, April 14, and September 28, 1907.

12. *CRATAEGUS MACKENZII* Sargent in Mackenzie and Bush,  
Man. Fl. Jackson County, Missouri, 108 (1902).

Glabrous with the exception of the hairs on the young leaves. Leaves ovate, acute, rounded, abruptly cuneate or truncate at the broad base, sharply often doubly serrate, with straight glandular teeth, and slightly divided into 3 or 4 pairs of narrow acuminate lateral lobes; deeply tinged with red when they unfold, more than half-grown when the flowers open about the 1st of May and then thin, yellow-green and slightly hairy above and pale and glabrous below, and at maturity thin, dark blue-green, smooth and lustrous on the upper surface, pale bluish green on the lower surface, 5-6 cm. long and 4.5-5 cm. wide, with slender yellow midribs, and thin primary veins; turning scarlet in the autumn; petioles slender, slightly

wing-margined and occasionally glandular near the apex, often rose-colored late in the season, 1.5–2 cm. in length; leaves on vigorous shoots thicker, mostly cordate at the base, more coarsely serrate, more deeply lobed, and from 5–6 cm. long and wide. Flowers on long stout pedicels, in narrow mostly 5- or 6-flowered corymbs, with oblong-obovate to linear glandular rose-colored bracts and bractlets often persistent until the petals fall, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes gradually narrowed from broad bases, short, acuminate, entire or minutely glandular-serrate, reflexed after anthesis; stamens 20; color of the anthers unknown; styles 4 or 5. Fruit ripening in October, on stout elongated erect or spreading pedicels, in few-fruited clusters, subglobose to short-oblong or often rather broader than high, somewhat angled, green, finally becoming lurid red, pruinose, 1–1.2 cm. in diameter; calyx prominent, with a short tube, a wide deep cavity broad and tomentose in the bottom, and spreading lobes, their tips often deciduous from the ripe fruit; flesh thin, dry and hard; nutlets 4 or 5, gradually narrowed and acute at the apex, rounded at the base, rounded and grooved or slightly ridged on the back, about 5 mm. long, and 4 mm. wide.

A shrub 2–7 m. high, with small intricately branched stems, and stout slightly zigzag branchlets dark orange-green when they first appear, becoming light chestnut-brown, very lustrous and marked by small pale lenticels in their first season and dull gray-brown the following year, and armed with numerous slender nearly straight purple shining spines 4–7 cm. long.

Rocky barrens, Jackson County; widely distributed but not common.

13. *CRATAEGUS DISJUNCTA* Sargent, *Trees and Shrubs*, i. 109, t. 55 (1903).

Monteer, Shannon County, *B. F. Bush* (Nos. 253, 345, 1488 and 1495), 1899, 1902.

14. *Crataegus rigida*, n. sp.

Glabrous with the exception of a few hairs on the upper side of the young leaves. Leaves oblong-obovate, acuminate, rounded or abruptly cuneate at the broad base, finely often doubly serrate above, with straight glandular teeth, and slightly divided into 4 or 5 pairs of small spreading acuminate lobes; about half-grown when the flowers open from the 20th to the 25th of April and then very thin, more or less tinged with red, smooth and slightly hairy on the midribs above and pale below, and at maturity thin, light yellow-green, smooth and lustrous on the upper surface, 4–5 cm. long and 3–4 cm. wide, with slender midribs, and thin obscure primary

veins; petioles slender, slightly wing-margined at the apex, rose color while young, glandular, with often persistent glands, 1.5–2 cm. in length. Flowers 1.8–2 cm. in diameter, on slender pedicels, in compact mostly 5–7-flowered corymbs, with linear-obovate to linear glandular rose-colored bracts and bractlets often persistent until the flowers open, the long lower peduncles from the axils of the upper leaves; calyx-tube narrowly obconic, the lobes gradually narrowed from wide bases, short, broad, acuminate, entire or minutely glandular-dentate, reflexed after anthesis; stamens 10; anthers pale pink; styles 2–5. Fruit ripening early in October, on slender drooping pedicels, in few usually 1- or 2-fruited clusters, subglobose, often broader than high, distinctly angled, green faintly flushed with rose color, pruinose, 1–1.2 cm. in diameter; calyx little enlarged, without a tube, with a broad shallow cavity, and small erect and spreading or incurved persistent green lobes; flesh thin, green, dry and hard; nutlets usually 3 or 4, narrowed and rounded at the base, more acute at the apex, ridged on the back, with a narrow grooved ridge, about 5 mm. long, and 4 mm. wide.

A shrub 3–4 m. high, with stems 5–8 cm. in diameter, covered with dark scaly bark, stout spreading and erect rigid branches, and slender zigzag branchlets dark orange-green when they first appear, becoming dull dark olive-green and marked by pale lenticels in their first season and dull reddish brown the following year, and armed with slender straight purplish shining spines 2–3 cm. long.

Oak woods on limestone hills, Pacific, Franklin County  
*J. H. Kellogg*, (no number) April 24 and September 31, 1907.

### 15. *Crataegus brachypoda*, n. sp.

Glabrous with the exception of the hairs on the upper surface of the young leaves and petioles. Leaves ovate, acuminate, rounded or abruptly cuneate at the broad entire or glandular base, coarsely doubly serrate above, with straight glandular teeth, and slightly divided into 5 or 6 pairs of short broad lateral lobes; about one-third grown when the flowers open early in May and then thin, yellow-green and slightly roughened above by short white hairs, and glabrous below, and at maturity thin, blue-green, smooth and lustrous on the upper surface, pale bluish green on the lower surface, 5.5–6 cm. long and 4–5 cm. wide, with thick midribs, and prominent primary veins arching obliquely to the points of the lobes; petioles slender, slightly wing-margined at the apex, soon becoming glabrous, glandular while young, with minute often stipitate glands, 2–3 cm. in length; leaves on vigorous shoots rounded or cordate at the broad base, more coarsely serrate, often 8–9 cm. long and 6–7 cm. wide, with foliaceous lunate glandular-serrate stipules. Flowers 2 cm. in diameter, on very short pedicels, in compact mostly 5- or 6-flowered corymbs, the lowest peduncle from the axil of an upper leaf; calyx-tube narrowly obconic, the

lobes gradually narrowed from broad bases, wide, short, acuminate, entire or occasionally glandular-dentate, reflexed after anthesis; stamens 10; anthers pale yellow; styles 3-5, surrounded at the base by a broad ring of pale hairs. Fruit ripening early in October and soon falling, on short pedicels, in few-fruited clusters, subglobose, green more or less tinged with red, finally becoming dull red, 1-1.2 cm. in diameter; calyx little enlarged, with a small shallow cavity, and spreading appressed often deciduous lobes dark red on the upper side below the middle; flesh thin, green, dry and hard; nutlets 3-5, narrowed and acute at the ends, or when 3, rounded at the ends, ridged on the back, with a broad grooved ridge, or when 5, rounded and slightly grooved on the back, 5.5-6 mm. long, and 3.5-4 mm. wide.

A tree 4-7 m. high, with a trunk 8-14 cm. in diameter, covered with dark rough scaly bark, spreading and ascending branches, and stout slightly zigzag branchlets dark orange-green tinged with red when they first appear, becoming dark chestnut-brown, lustrous, and marked by pale lenticels in their first season and dull reddish brown the following year, and armed with numerous slender nearly straight purple shining spines 2.5-5 cm. long.

Gravelly banks of streams near Grandin, Carter County, *B. F. Bush* (No. 4 type), May 6, and Oct. 10, 1905, (No. 4 A) May 7 and Oct. 12, 1905, also (No. 282), May 4, 1901; Pleasant Grove, Ripley County, *B. F. Bush*, (Nos. 386, 387, 388) May 7, 1901.

#### 16. *Crataegus sicca*, n. sp.

Leaves rhombic to ovate, acuminate, gradually narrowed to the cuneate entire base, finely doubly serrate above, with incurved glandular teeth, and slightly divided above the middle into 3 or 4 pairs of small acute lobes; deeply tinged with red when they first appear, about one-half grown when the flowers open from the 20th to the end of April and then very thin, roughened above by short white hairs and slightly hairy on the midribs below, and at maturity thin but firm in texture, dark yellow-green, glabrous, smooth and lustrous on the upper surface, pale on the lower surface, 3.5-4.5 cm. long and 2.5-3 cm. wide, with thin prominent sparingly hairy midribs and veins; petioles slender, slightly wing-margined at the apex, villose while young, becoming nearly glabrous, often dark rose color in the autumn, 8-12 mm. in length. Flowers 1.8-2 cm. in diameter, on short slender slightly villose pedicels, in small compact mostly 5-8-flowered corymbs, the lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, glabrous, the lobes short, slender, acuminate, glandular-serrate usually only above the middle, often light red, glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 10; anthers



white; styles 3-5. Fruit ripening early in October, on short slender hairy spreading pedicels, in few-fruited clusters, subglobose to short-oblong, green, becoming light orange-yellow, marked by large pale dots, about 1 cm. in diameter; calyx little enlarged, with a short tube, a narrow deep cavity pointed at the base, and small spreading usually persistent green lobes; flesh thick, green, dry and mealy; nutlets 3-5, gradually narrowed and acute at the ends, ridged on the back, with a broad high grooved ridge, 6-6.5 mm. long, and about 5 mm. wide.

A shrub 1-2 m. high, with small intricately branched stems, and very slender nearly straight glabrous branchlets light green when they first appear, becoming light chestnut-brown, lustrous and marked by pale lenticels in their first season and dull gray-brown the following year, and unarmed or armed with slender straight purple spines 3-3.5 cm. long.

Dry limestone hills, Pacific, Franklin County, *C. S. Sargent*, (No. 1) October 1, 1901, *J. H. Kellogg*, (No. D type) April 24 and 29, 1907.

#### MOLLES.

Leaves broad, tomentose or pubescent; petioles long; flowers 1.8-2.5 cm. in diameter, in usually many-flowered tomentose or villose corymbs; stamens 20, or 15 in No. 4; fruit subglobose, short-oblong or obovate, red or rarely yellow, often more or less pubescent, 1-2.5 cm. in diameter; flesh thick, often edible; nutlets generally 5, thin, narrowed at the ends, only obscurely grooved or ridged on the back.

Anthers yellow or white.

Leaves mostly broad and rounded at the base.

Fruit subglobose to short-oblong.

Leaves thick to subcoriaceous, broadly ovate, yellow-green; flowers in many-flowered hoary-tomentose corymbs; fruit ripening in August and September.

1. *C. mollis*.

Leaves thin, ovate, blue-green; flowers in 8-12-flowered slightly villose corymbs; fruit ripening in October.

2. *C. declivitatis*.

Fruit oval, crimson, ripening in October; leaves ovate, thin.

Fruit 1.8-2 cm. long; nutlets 7.5-8 mm. in length; leaves scabrate above.

3. *C. macrophylla*.

Fruit not more than 1.5 cm. long; nutlets 5-5.5 mm. in length; leaves smooth above; stamens 15.

4. *C. lasiantha*.

Fruit obovate; leaves ovate, scabrate above.

Flowers on short pedicels, in wide 15-20-flowered corymbs; fruit ripening in October.

5. *C. umbrosa*.

Flowers on long pedicels, in compact 10-15-flowered corymbs; fruit ripening early in August.

6. *C. lanigera*.

Leaves narrow at the base, ovate to oval, yellow-green.

Fruit subglobose, crimson, ripening late in September; leaves scabrate above.

7. *C. Treleasei*.

Fruit obovate, scarlet, ripening in August; leaves glabrous above.

8. *C. dumetosa*.

Anthers rose color.

Leaves broad at the base.

Leaves thin, smooth, yellow-green; fruit subglobose to ovate, bright yellow, ripening at the end of September.

9. *C. Kelloggii*.

Leaves subcoriaceous, scabrous, dark blue-green; fruit subglobose to short-oblong, dark crimson, ripening at the end of October.

10. *C. lanuginosa*.

Leaves narrow at the base, thin, yellow, scabrate; fruit obovate, light cherry-red, ripening in October.

11. *C. dispessa*.

1. *CRATAEGUS MOLLIS* Scheele, *Linnaea*, xxi. 569 (1848).—Sargent, *Silva N. Am.* xiii. 83, t. 659; *Bot. Gazette*, xxxv. 379; *Manual*, 423, f. 341; *Rep. Geolog. Surv. Michigan*, 1906, 343.

This species, widely and generally distributed usually on bottom-lands from Ohio to Nebraska, is apparently common in the neighborhood of St. Louis and in Jackson County, and possibly reaches Jasper County. Some of the trees, however, which have been referred to this species, vary greatly in the thickness of their leaves and in the time when the fruit ripens, and I have not yet sufficient material and information to make it possible to form a clear idea of the limits of variation and of the range of this tree in Missouri.

## 2. *Crataegus declivitatis*, n. sp.

Leaves ovate, acuminate, rounded or abruptly cuneate at the broad base, coarsely often doubly serrate, with straight glandular teeth, and slightly divided into 5 or 6 pairs of acuminate spreading lobes; slightly tinged with red when they unfold, not more than a quarter grown when the flowers open from the middle to the 20th of April and then very thin, covered above by short white hairs and villose on the midribs and primary veins below, and at maturity thin, dark bluish green, glabrous and tomentose on the upper surface, pale blue-green on the lower surface, 6-8 cm. long and 5-6 cm. wide, with thin sparingly villose midribs and primary

veins; petioles slender, slightly wing-margined at the apex, coated while young with matted pale hairs, becoming nearly glabrous, 2–3.5 cm. in length; stipules linear-obovate, falcate, acute, glandular-serrate, fading brown, often persistent until the flowers open; leaves on vigorous shoots very coarsely serrate, more deeply lobed, and often 10–11 cm. long and 9–10 cm. wide, with foliaceous lunate coarsely serrate deciduous stipules. Flowers 1.7–1.8 cm. in diameter, on long slender slightly hairy pedicels, in compact mostly 8–12-flowered corymbs, with linear-obovate to linear glandular bracts and bractlets often persistent until the flowers open; calyx-tube broadly obconic, glabrous, the lobes abruptly narrowed from the base, short, wide, acuminate, glandular-serrate usually only above the middle, glabrous on the outer, slightly villose on the inner surface, reflexed after anthesis; stamens 20; anthers light yellow; styles 5, surrounded at the base by a broad ring of pale tomentum. Fruit ripening in October, on spreading nearly glabrous pedicels, in few-fruited clusters, subglobose to short-oblong, green tinged with dull red, very hard (September 28, 1907), slightly pubescent at the ends when fully grown, becoming glabrous, 1.2–1.3 cm. in diameter; calyx prominent, with a short tube, a broad deep cavity pointed in the bottom, and slightly spreading and erect often deciduous lobes hairy on the upper side; flesh green, dry and hard; nutlets 5, gradually narrowed and rounded at the base, broad and rounded at the apex, rounded and slightly grooved on the back, 7–7.5 mm. long, and about 4 mm. wide.

A shrub 3–5 m. high, with stems 7.5–10 cm. in diameter, covered with dark scaly bark, spreading branches forming a round-topped head, and slender slightly zigzag branchlets dark green and sparingly villose when they first appear, becoming light chestnut-brown, lustrous, glabrous and marked by dark lenticels in their first season and dull gray-brown the following year, and armed with stout straight or slightly curved chestnut-brown spines 1.5–2 cm. long.

Steep bluffs of the Mississippi River, South St. Louis, St. Louis County, *J. H. Kellogg*, (no number) May 5, 1902, September 9, 1906, April 19 and September 28, 1907.

### 3. *Crataegus macrophylla*, n. sp.

Leaves ovate, acute or acuminate, rounded, truncate, abruptly cuneate or slightly cordate at the broad base, coarsely often doubly serrate, with straight glandular teeth, and slightly divided into 5 or 6 pairs of small acuminate lateral lobes; about half-grown when the flowers open in the last week of April and then very thin, dark yellow-green and strigose above and covered below with pale hairs most abundant on the midribs and veins, and at maturity thin, yellow-green, lustrous and scabrate on the upper surface and villose on the slender midribs and primary veins on the

lower surface, 8-9 cm. long and 6.5-7 cm. wide; petioles stout, hoary-tomentose early in the season, becoming villose, 2-3 cm. in length; stipules linear-lanceolate, falcate, glandular-serrate, hairy, deciduous; leaves on vigorous shoots cordate at the base, more coarsely serrate and often 9-10 cm. long and 8.5-9 cm. wide, with glandular petioles 3-4 cm. long, and large foliaceous lunate coarsely serrate persistent stipules. Flowers 2-2.2 cm. in diameter, on short stout hoary-tomentose pedicels, in small compact mostly 8-12-flowered corymbs, with oblong-obovate to linear often falcate tomentose bracts and bractlets persistent until the flowers open, the short lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, densely coated with matted pale hairs, the lobes long, narrow, acuminate, irregularly glandular-dentate, glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 20; anthers cream color; styles 5. Fruit ripening in October, on stout villose pedicels, in few-fruited drooping clusters, oval, gradually narrowed and rounded at the apex, more abruptly narrowed at the base, crimson, lustrous, marked by large pale dots, pubescent at the ends, 1.8-2 cm. long and 1.5-1.6 cm. in diameter; calyx with a short tomentose tube, and a deep narrow cavity tomentose in the bottom and nearly closed by the small erect lobes; flesh thin, yellow, dry and hard; nutlets 5, gradually narrowed and rounded at the ends, rounded and slightly grooved on the back, 7.5-8 mm. long, and 5.5-6 mm. wide.

A tree 7-8 m. high, with a trunk covered with dark rough bark, spreading branches, and stout nearly straight branchlets coated with hoary tomentum when they first appear, light orange-brown, lustrous, marked by pale lenticels and very slightly hairy at the end of their first season, becoming light gray the following year, and armed with straight slender purplish spines 3-4 cm. long.

River des Pères bottoms, Carondelet, St. Louis County, J. H. Kellogg, (No. 6 type) April 27 and October 1, 1902.

#### 4. *Crataegus lasiantha*, n. sp.

Leaves ovate, acute at the apex, rounded or truncate at the base, coarsely doubly serrate, with straight glandular teeth, and slightly divided into 6 or 7 pairs of small acute lateral lobes; nearly half-grown when the flowers open the first of May and then very thin, dark bluish green, slightly roughened by short white hairs and villose on the midribs above and villose especially on the midribs and veins below, and at maturity thin but firm in texture, dark yellow-green, smooth and lustrous on the upper surface, pale and still hairy on the lower surface on the stout yellow midribs, and thin primary veins extending obliquely to the points of the lobes, 8-10 cm. long and 5-8 cm. wide; petioles stout, slightly wing-margined at the apex, densely hoary tomentose early in the season, becoming pubescent, 2.5-4

cm. in length; leaves on vigorous shoots more coarsely serrate and more deeply lobed, often 10–12 cm. long and 7–9 cm. wide. Flowers about 1.8 cm. in diameter, on stout hoary-tomentose pedicels, in narrow compact tomentose mostly 5- or 6-flowered corymbs, with lanceolate to linear acuminate glandular green bracts and bractlets often persistent until after the petals fall, the long lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, hoary-tomentose, the lobes long, slender, acuminate, laciniately glandular-serrate, densely villose, reflexed after anthesis; stamens 15; anthers pale yellow; styles 5. Fruit ripening in October, on long stout slightly hairy pedicels, in drooping few-fruited clusters, oval, crimson, lustrous, marked by small pale dots, densely villose when fully grown, becoming nearly glabrous late in the autumn, about 1.5 cm. long and 1.2 cm. in diameter; calyx prominent, with a short tube, a very deep narrow cavity, and spreading or incurved lobes dark red and nearly glabrous on the upper side; flesh thick, yellow, dry and hard; nutlets 5, narrowed and rounded at the apex, acute at the base, rounded and sometimes obscurely ridged on the back, only 5–5.5 mm. long, and 4 mm. wide.

A tree 7–8 m. high, with stout slightly zigzag branchlets thickly coated with hoary tomentum when they first appear, becoming light orange-brown and marked by pale lenticels in their first season, and light red-brown and lustrous the following year, and armed with slender slightly curved purplish spines 5.5–6 cm. long.

Low moist soil near streams, Webb City, Jasper County, *E. J. Palmer* and *C. S. Sargent*, (No. 11 D type) October 2, 1901, *E. J. Palmer*, July 16, 1901, May 4, 1902, (No. 11) *E. J. Palmer*, April 12, 1903, (No. 11 B) *E. J. Palmer*, September 8, 1901, (No. 11 C) *E. J. Palmer*, November 1, 1901, (No. 20) May 18, 1902, April 12, 1902.

This species is exceptional in this group in the small size of the nutlets and in the unusual development of the hypostyle which sometimes covers a large part of their inner faces.

## 5. *Crataegus umbrosa*, n. sp.

Leaves ovate, acuminate, rounded, truncate or abruptly cuneate at the broad base, coarsely often doubly serrate, and usually divided into 4 or 5 pairs of wide acuminate spreading lobes; about one-third grown when the flowers open from the middle to the 20th of April and then thin, dark yellow-green and covered above with soft white hairs and hoary-tomentose below, and at maturity thin, yellow-green and scabrate on the upper surface and tomentose on the lower surface especially on the slender midribs and primary veins, 7–8 cm. long and 5–5.5 cm. wide; petioles slender,

slightly wing-margined at the apex, densely coated with hoary tomentum, 2-3 cm. in length; leaves on vigorous shoots ovate, abruptly or sharply cuneate at the base, more coarsely serrate, more deeply lobed and often 10-12 cm. long and 8-10 cm. wide. Flowers about 2 cm. in diameter, on short stout tomentose pedicels, in wide mostly 15-20-flowered tomentose corymbs, with oblong to linear often falcate green bracts and bractlets persistent until the flowers open, the lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, densely tomentose, the lobes gradually narrowed from the base, long, broad, acuminate, coarsely glandular-serrate, tomentose below and glabrous above on the outer surface, slightly villose on the inner surface, reflexed after anthesis; stamens 20; anthers white; styles 5, surrounded at the base by a narrow ring of pale tomentum. Fruit ripening in October, on slender hairy red pedicels, in drooping many-fruited clusters, obovate to subglobose, scarlet, marked by pale dots, pubescent at the ends, about 1 cm. in diameter; calyx little enlarged, with a deep narrow cavity and small spreading and appressed persistent lobes pubescent on the upper surface; flesh thin, dry and hard; nutlets 5, thin, gradually narrowed and acute at the ends, rounded and slightly grooved on the back, 7.5-8 mm. long, and 5.5-6 mm. wide.

A tree sometimes 10 m. high, with a trunk 1-2 dm. in diameter, covered with light gray bark broken into small close persistent scales, large erect and spreading branches forming a wide open irregular head, and slender slightly zigzag branchlets thickly coated with hoary tomentum when they first appear, remaining green and tomentose through their first season, becoming light olive-green, lustrous and marked by numerous dark lenticels in their second season and light gray the following year, and armed with many stout or slender straight or slightly curved purplish shining spines 3-4 cm. long.

River des Pères bottoms, Carondelet, St. Louis County, *J. H. Kellogg*, (No. 10 type) October 8, 1901, April 26 and October 8, 1903, April 17, 1905.

## 6. *Crataegus lanigera*, n. sp.

Leaves ovate, acuminate, abruptly concave-cuneate or rounded at the entire base, coarsely often doubly serrate above, with straight glandular teeth, and slightly divided into 3 or 4 pairs of small acute lateral lobes; less than one-quarter grown when the flowers open the middle of April and then thin, yellow-green and covered above with soft white hairs and hoary-tomentose below, and at maturity conspicuously reticulate-venulose, thin, yellow-green, lustrous and scabrate on the upper surface, paler, yellow-green and still tomentose on the lower surface, 6-7 cm. long and 5-5.5 cm. wide, with stout tomentose midribs, and slender primary veins extend-

ing to the points of the lobes; petioles slender, slightly wing-margined at the apex, tomentose, sparingly glandular while young, 1.5–2.5 cm. in length; leaves on vigorous shoots ovate, acuminate, rounded or subcordate at the base, more coarsely serrate, only slightly lobed and often 9–10 cm. wide, with stout petioles often rose color in the autumn, and foliaceous lunate glandular-serrate persistent stipules. Flowers 1.8–2 cm. in diameter, on long stout hairy-tomentose pedicels, in compact hoary-tomentose mostly 10–15-flowered corymbs, with oblong-obovate to linear glandular bracts and bractlets often persistent until the flowers open, the long lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, tomentose; the lobes short, broad, acuminate, laciniately glandular-serrate, pubescent on the outer, glabrous on the inner surface, reflexed after anthesis; stamens 20; anthers white; styles 5, surrounded at the base by a narrow ring of pale tomentum. Fruit ripening early in August, on stout drooping red hairy pedicels, in few-fruited clusters, obovate, full and rounded at the apex, gradually narrowed to the slender base, crimson, lustrous, pubescent at the ends, 1.8–2 cm. long and 1–1.1 cm. in diameter; calyx little enlarged, with a deep narrow cavity tomentose in the bottom, and small spreading appressed lobes; flesh thin, yellow, rather juicy; nutlets 5, thin, acute at the base, rounded at the apex, only slightly ridged on the back, about 7 mm. long, and 4.5 mm. wide.

A tree 7–8 m. high, with a stem sometimes a decimeter in diameter, covered with dark rough bark, large spreading branches forming a wide irregular head, and stout slightly zigzag branchlets coated when they first appear with long matted white hairs, becoming light chestnut-brown, sparingly villose and marked by small pale lenticels in their first season and glabrous and pale red the following year, and armed with slender straight or slightly curved purple shining spines 3–4.5 cm. long.

Roadside on the bank of Cahokia Creek north of Cahokia, Illinois, *J. H. Kellogg* (No. 51 A type), August 2, 1902, April 17, 1907, north of Cahokia (no number), August 2, 1903, April 17, 1907, (No. 52) August 2, 1902, April 27, 1903, April 17, 1907; East St. Louis, *J. H. Kellogg*, No. E, (with larger leaves, narrower fruit and much smaller spines), is possibly distinct, August 11, 1902, April 21, 1903.

7. *CRATAEGUS TRELEASEI* Sargent, *Trees and Shrubs*, i. 63, t. 32 (1903); *Manual*, 427, f. 345.

Banks of small streams, Doe Run to Bismarck, St. Francois County.

### 8. *Crataegus dumetosa*, n. sp.

Leaves ovate to oval, acute or acuminate, gradually narrowed and rounded or abruptly cuneate at the entire base, coarsely often doubly serrate above, with straight glandular teeth, and slightly divided usually only above the middle into 3 or 4 pairs of acute lobes; nearly half-grown when the flowers open about the middle of April and then thin, yellow-green and roughened above by short white hairs and hoary tomentose below especially on the midribs and veins, and at maturity thin, yellow-green, smooth and lustrous on the upper surface, pale yellow-green and villose on the lower surface especially on the stout midribs, and slender primary veins arching obliquely to the points of the lobes, 5-6 cm. long and 4-5 cm. wide; petioles slender, hoary-tomentose early in the season, becoming pubescent, 1-2.5 cm. in length; leaves on vigorous shoots more coarsely serrate, more deeply lobed, often 7-8 cm. long and 6-7 cm. wide, with narrow lunate finely glandular-serrate persistent stipules. Flowers 2-2.2 cm. in diameter, on stout hoary-tomentose pedicels, in compact mostly 10-15-flowered corymbs, with linear falcate acuminate villose glandular often persistent bracts and bractlets, the long lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, thickly coated with long matted white hairs, the lobes short, slender, acuminate, glandular-serrate, pubescent on the outer, villose on the inner surface, reflexed after anthesis; stamens 20; anthers pale yellow; styles 5, surrounded at the base by a narrow ring of pale tomentum. Fruit ripening early in August, on short stout slightly hairy spreading pedicels, in few-fruited clusters, obovate, gradually narrowed and rounded at the apex, rather abruptly narrowed and rounded at the base, scarlet, lustrous, slightly pubescent at the ends, marked by small dark dots, 1.2-1.3 cm. long and 1 cm. in diameter; calyx prominent, with a short tube, a wide deep cavity, and spreading and appressed lobes only slightly hairy on the upper side; flesh thin, yellow, dry and hard; nutlets 5, thin, acute at the ends, rounded or sometimes slightly grooved on the back, 6.5-7 mm. long, and about 5 mm. wide.

A shrub 2-3 m. high, with numerous small stems covered with dark slightly scaly bark, slender ascending branches, and stout somewhat zigzag branchlets coated when they first appear with hoary tomentum, becoming light chestnut-brown, glabrous, lustrous, and marked by pale lenticels in their first season and dull reddish brown the following year, and armed with few slender nearly straight purple ultimately gray spines 2-3 cm. long.

Thickets in fertile uplands, Neck City, Jasper County, *E. J. Palmer*, (No. 2 type) August 8, 1902, April 15, 1903, March 31 and October 4, 1907.



9. *CRATAEGUS KELLOGGII* Sargent, Trees and Shrubs, i. 117, t. 59 (1903); Manual, 431, f. 349.

River Des Pères bottoms, Carondelet, St. Louis County.

10. *CRATAEGUS LANUGINOSA* Sargent, Trees and Shrubs, i. 113, t. 57 (1903); Manual, 435, f. 353.

Near Webb City, Jasper County, common.

11. *CRATAEGUS DISPESSA* Ashe, Jour. Elisha Mitchell Sci. Soc. xix. pt. i. 17 (1903).

*Crataegus pyramidalis* Britton, Bull. N. Y. Bot. Gard. i. 449 (not Jacques, Jour. Soc. Hort. France, iv. 599 [1858]) (1900).—Sargent, Silva N. Am. xiii. 97, t. 666; Manual, 434, f. 352.

Near streams, Monteer, Shannon County.

#### DILATATAE.

Leaves wide at the base, often broader than long on vigorous shoots; petioles long and slender; flowers large, in compact 5–8-flowered corymbs; stamens 20; anthers rose color; fruit broader than high, slightly angled, crimson, lustrous, 2–2.2 cm. in diameter.

Flowers not more than 1.8 cm. in diameter, on very short often slightly villose pedicels; fruit flattened at the ends; calyx much enlarged on the fruit, with a narrow deep cavity pointed in the bottom, and broad lobes bright red on the upper side; flesh red.

##### 1. *C. coccinioides*.

Flowers up to 2.5 cm. in diameter, on longer glabrous pedicels; fruit rounded at the ends; calyx little enlarged on the fruit, with a very broad shallow cavity wide in the bottom, and narrow lobes not red on the upper side; flesh pale yellow.

##### 2. *C. speciosa*.

1. *CRATAEGUS COCCINIOIDES* Ashe, Jour. Elisha Mitchell Sci. Soc. xvi. pt. ii. 74 (1900).—Sargent, Silva N. Am. xiii. 115, t. 674; Manual, 458, f. 374.

*Crataegus Eggeri* Britton, Bull. N. Y. Bot. Gard. i. 447 (1900); Manual, 520.

Woods, west of Forest Park, St. Louis, Fenton, and Allenton, St. Louis County; Pacific, Franklin County.

2. *CRATAEGUS SPECIOSA* Sargent, Trees and Shrubs, i. 65, t. 33 (1903).

Rocky hills, near Webb City, Jasper County; common, *E. J. Palmer* (No. 5 type).

## COCCINEAE.

Leaves rhombic to oblong-obovate, cuneate at the base, subcoriaceous, dark green and lustrous above; petioles long; flowers 1.5–1.8 cm. in diameter, in many-flowered hairy corymbs; stamens 20; anthers pale yellow; fruit short-oblong to subglobose, dull red, 1.2–1.4 cm. in diameter; nutlets 2 or 3, rounded at the apex, acute at the base.

1. CRATAEGUS MARGARETTA Ashe, Jour. Elisha Mitchell Sci. Soc. xvi. pt. ii. 72 (1900).—Sargent, Silva N. Am. xiii. 137, t. 685; Manual, 461, f. 377.

Webster and Bertold, St. Louis County; Springfield, Greene County; also in Illinois, Iowa, Michigan, Ontario, and middle Tennessee.

## INTRICATAE.

Leaves cuneate at the base; petioles long, usually slender; flowers 1.6–2.5 cm. in diameter, in few-flowered corymbs; fruit subglobose to short-oblong, 1–1.5 cm. long; flesh dry and hard; nutlets 3–5, rounded at the ends, usually conspicuously ridged on the back.

Stamens 10; glabrous with the exception of occasional hairs on the young leaves and calyx-lobes.

Anthers rose color; calyx-lobes glabrous; fruit orange-red; leaves ovate to rhombic.

1. *C. Neo-Bushii*.

Anthers yellow, faintly tinged with rose; calyx-lobes sparingly villose on the inner surface; fruit green slightly flushed with red; leaves ovate to oval.

2. *C. padifolia*.

Stamens 5–10.

Anthers yellow slightly tinged with rose; flowers 1.6–1.8 cm. in diameter, in densely villose corymbs; calyx-lobes villose; fruit orange-yellow, hairy at the ends; leaves blue-green, scabrate.

3. *C. villicarpa*.

Anthers yellow; flowers 2–2.5 cm. in diameter, in glabrous corymbs; calyx-lobes glabrous; fruit green flushed with red, glabrous; leaves yellow-green, smooth.

4. *C. leioclada*.

1. CRATAEGUS NEO-BUSHII Sargent, Trees and Shrubs, ii. 9, t. 105 (1907).

Dry gravelly soil near Monteer, Shannon County, *B. F. Bush*, (Nos. 10 A, 10 B type) May and October 1905.

2. *CRATAEGUS PADIFOLIA* Sargent, *Trees and Shrubs*, ii. 75, t. 135 (1908).

Hillsides, Swan, Taney County, *B. F. Bush*, (No. 5 B type) April and September 1907, (also Nos. 5, 5 A, 5 C, 5 D, 5 F, 5 I, 5 J, 5 K, 149 and 152).

3. *Crataegus villicarpa*, n. sp.

Leaves ovate, acuminate, gradually narrowed and concave-cuneate at the entire base, finely doubly serrate above, with straight or incurved glandular teeth, and slightly divided into 3 or 4 pairs of slender acuminate lateral lobes; more than half-grown when the flowers open from the 10th to the middle of May and then dark blue-green and setose above and sparingly villose below along the midribs and veins, and at maturity thin but firm in texture, blue-green and scabrate on the upper surface, scabrate, and slightly villose on the midribs and veins on the lower surface, 5-6 cm. long and 3.5-4.5 cm. wide; petioles slender, narrowly wing-margined to the middle, densely villose early in the season, becoming pubescent or nearly glabrous, glandular, with persistent glands, 2-3 cm. in length; leaves on vigorous shoots broadly ovate, short-pointed at the apex, rounded or subcordate at the base, more coarsely serrate and often 5-6 cm. long and broad. Flowers 1.6-1.8 cm. in diameter, on short slender densely villose pedicels, in small compact mostly 3-5-flowered hairy corymbs, with conspicuous oblong-obovate coarsely glandular-serrate bracts and bractlets mostly persistent until the flowers open; calyx-tube narrowly obconic, thickly covered with long matted white hairs, the lobes long, slender, acuminate, glandular-serrate, nearly glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 5-10; anthers pale yellow; styles 3-5, surrounded at the base by a ring of pale tomentum. Fruit short-oblong to subglobose, full and rounded at the ends, orange-yellow sometimes more or less tinged with red, marked by large pale dots, villose at the ends, with long scattered pale hairs, 1-1.2 cm. in diameter; calyx prominent, with a broad shallow cavity wide and tomentose in the bottom, and elongated spreading and appressed persistent lobes ciliate on the margins towards the base and villose on the upper side; flesh thin, yellow, dry and mealy; nutlets 3-5, rounded at the ends or acute at the apex, ridged on the back, with a broad low slightly grooved ridge, 4.5-5 mm. long, and about 4 mm. wide.

A shrub 1-2 m. high, with small pale gray stems, very slender slightly zigzag branchlets light red-brown and covered with long white hairs when they first appear, becoming dull chestnut-brown and pubescent in their first season and gray tinged with red the following year, and armed with numerous slender curved or straight bright red-brown shining spines

pointing toward the base of the branch and 3.5-6 cm. long, and small pale winter-buds.

Rocky hills and barrens, Swan, Taney County, *B. F. Bush*, (No. 2 D type) May 19 and October 7, 1907, (No. 2) May 19, 1905, (Nos. 2 B, 2 C, 2 E, 2 F) May 16, 1907, (No. 366) June 9, 1898, (Nos. 43, 46, 52 and 107) June 18, 1899, (No. 509) September, 1899.

#### 4. *Crataegus leioclada*, n. sp.

Glabrous with the exception of the hairs on the young leaves and calyx-lobes. Leaves ovate to oval, acuminate, gradually or abruptly narrowed and concave-cuneate at the broad base, sharply often doubly serrate, with long straight or incurved glandular teeth, and deeply divided into 4 or 5 pairs of slender acuminate spreading lateral lobes; nearly fully grown when the flowers open the middle of May and then very thin, dark yellow-green, lustrous and sparingly hairy above, with soft white hairs, paler, lustrous and glabrous below, and at maturity thin but firm in texture, yellow-green, lustrous on the upper surface, paler on the lower surface, 5-6 cm. long and 4-4.5 cm. wide, with conspicuous yellow midribs, and thin primary veins extending obliquely to the points of the lobes; petioles slender, slightly wing-margined at the apex, sparingly villose on the upper side while young, soon glabrous, glandular, with numerous minute dark persistent glands, 1.2-1.6 cm. in length. Flowers 2-2.5 cm. in diameter, on long stout pedicels, in mostly 2-4-flowered narrow corymbs, the elongated lowest peduncle from the axil of an upper leaf; calyx-tube broadly obconic, the lobes gradually narrowed from wide bases, long, slender, acuminate, rose-colored and glandular at the apex, glandular-serrate to above the middle, glabrous on the outer, sparingly villose on the inner surface, reflexed after anthesis; stamens 5-10; anthers yellow faintly tinged with rose color; styles 3 or 4. Fruit ripening late in September or early in October, on long drooping pedicels, in 2- or 3-fruited clusters, subglobose to short-oblong, full and rounded at the ends, green more or less flushed with red, 1-1.2 cm. in diameter; calyx little enlarged, with a deep narrow cavity, and elongated spreading and closely appressed or erect and incurved lobes; flesh thin, green and hard; nutlets 2 or 3, rounded at the ends, ridged on the back, with a broad high grooved ridge, 7-7.5 mm. long, and about 4 mm. wide.

A slender shrub 2-3 m. high, with small stems covered with smooth pale bark, small spreading branches, and very slender slightly zigzag branchlets dark orange-green more or less tinged with red and marked by pale lenticels when they first appear, becoming bright chestnut-brown and very lustrous in their first season and dull dark gray-brown the following year, and armed with occasional stout straight spines.

Rocky hills and barrens, near Swan, Taney County, *B. F. Bush*, (No. 4 A type) September 22, 1905, May 17 and October 7, 1907, (Nos. 4, 4 B, 4 D) September 22, 1905, May 17, 1907, (Nos. 4 C, A. F, G, M) September 23, 1905.

#### UNIFLORAE.

Leaves oblong-obovate, cuneate at the base; petioles short; flowers in 2- or 3-flowered hoary-tomentose corymbs; stamens 20; anthers yellow; fruit obovate, light orange-red, lustrous, up to 1.4 cm. long; nutlets 3 or 4, acute at the ends.

1. *CRATAEGUS TRIANTHOPHORA* Sargent, *Trees and Shrubs*, ii. 11, t. 106 (1907).

Dry open woods, near Grandin, Carter County, *B. F. Bush* (No. 12 type), May and October, 1905.

#### MICROCARPAE.

Flowers not more than 1 cm. in diameter, in many-flowered glabrous corymbs; stamens 20; anthers rose color; fruit depressed-globose, scarlet, not more than 6 mm. in diameter; leaves broadly ovate to triangular.

1. *CRATAEGUS CORDATA* Aiton, Hort. Kew. ii. 168 (1788).—Torrey & Gray, Fl. N. Am. i. 467.—Chapman, Fl. 127.—Watson & Coulter, Gray's Man. ed. 6, 165.—Sargent, Garden and Forest, ii. 423, f. 126; Silva N. Am. iv. 107, t. 186; Manual, 487, f. 402.

Pleasant Grove, Grandin; and Birch Tree, Shannon County, Williamsville, Wayne County, Bismarck, St. François County; also southern Illinois and through middle Kentucky and Tennessee to Virginia, and along the Appalachian foothills from Virginia to middle Georgia and to Alabama.

#### TOMENTOSAE.

Fruit obovate to subglobose or short-oblong, orange-red, scarlet or rarely green, usually becoming soft and succulent at maturity, 6-12 mm. in diameter; nutlets 2 or 3, obtuse at the ends, prominently ridged on the back; flowers small, opening late, in tomentose or villose usually many-flowered corymbs; leaves thin to subcoriaceous, more or less pubescent below during the season.

Leaves thin, with midribs and veins only slightly impressed on their upper surface.

Anthers rose color (pink in No. 2).

Stamens 20.

Fruit obovate; flowers in wide many-flowered corymbs.

Fruit up to 1 cm. in length, dull orange-red; leaves ovate to oblong; branchlets ashy gray, usually unarmed or with occasional small gray spines.

1. *C. tomentosa*.

Fruit not more than 8 mm. in diameter; leaves broadly ovate to broadly oval, branchlets light chestnut-brown and lustrous, armed with numerous long purple spines; anthers pink.

2. *C. hispida*.

Fruit short-oblong to oval or slightly obovate, up to 1 cm. in length; flowers in compact mostly 3-8-flowered corymbs; leaves ovate to obovate.

3. *C. missouriensis*.

Fruit globose to short-oblong, not more than 8 mm. in diameter; flowers in 12-15-flowered corymbs; leaves slightly obovate to oval or ovate.

4. *C. globosa*.

Stamens 5-10.

Fruit obovate, 7-8 mm. in length; leaves ovate to rhombic; stamens 7-10.

5. *C. obscura*.

Fruit short-oblong to subglobose.

Flowers in many-flowered corymbs.

Leaves broadly ovate; stamens 10.

6. *C. spinulosa*.

Leaves ovate to oval; stamens 5-8, usually only 5.

7. *C. mollita*.

Flowers in mostly 5-8-flowered corymbs; leaves ovate to obovate; stamens 5-10.

8. *C. rupicola*.

Anthers yellow; stamens 10.

Leaves narrowly obovate to rhombic or ovate; fruit short-oblong, green or yellowish red.

9. *C. pudens*.

Leaves ovate to oval or obovate; fruit subglobose to short-oblong, bright orange-red.

10. *C. mollicula*.

Leaves subcoriaceous, with midribs and veins deeply impressed on their upper surface and pubescent below; flowers in many-flowered corymbs.

Stamens 20.

Leaves broadly ovate to broadly obovate, rather thick; anthers dark red; fruit obovate.

11. *C. insperata*.

Leaves rhombic to slightly obovate, thicker; anthers pale salmon color.

12. *C. ensifera*.

Stamens 10; anthers yellow; leaves ovate to rhombic; fruit subglobose to short-oblong.

13. *C. pertomentosa*.

1. *CRATAEGUS TOMENTOSA* Linnaeus Spec. 476 (1753).—Torrey & Gray, Fl. N. Am. i. 465.—Chapman, Fl. 127.—Watson & Coulter, Gray's Manual, ed. 6, 166.—Sargent, Silva N. Am. iv. 101, t. 183; Proc. Phil. Acad. Sci. 1905, 656; Manual, 492; Rep. Geolog. Surv. Michigan, 1906, 560.

Allenton, St. Louis County, *G. W. Letterman*, April 25, 1880, May 10, 1881, October 1882, June 1, 1883; near Webster, St. Louis County, *H. Eggert*, May 24, 1887; also through Illinois, southern Michigan, Ontario, western New York and Pennsylvania.

## 2. *Crataegus hispidula*, n. sp.

Leaves broadly ovate to broadly oval, acuminate, abruptly cuneate or rounded at the base, sharply often doubly serrate above, with long straight glandular teeth, and slightly divided into 4 or 5 pairs of small acuminate spreading lobes; about one-third grown when the flowers open from the 15th to the 25th of May and then thin, dark green, scabrous, and slightly hairy on the midribs above, and pale and villose on the midribs and veins below, and at maturity thin, yellow-green and scabrate on the upper surface, still slightly villose on the lower surface on the prominent midribs and primary veins, 6–8 cm. long and 5–7 cm. wide; petioles stout, broadly wing-margined nearly to the base, villose, 1–1.5 cm. in length; leaves on vigorous shoots ovate, acuminate, abruptly concave-cuneate at the base, more coarsely serrate and more deeply lobed, often 8 to 9 cm. long and 6–7 cm. wide, with broad-winged petioles, and foliaceous lunate coarsely glandular-serrate persistent stipules sometimes 2 cm. in length. Flowers about 1 cm. in diameter, on short stout hoary-tomentose pedicels, in compact tomentose mostly 12–20-flowered corymbs, the short lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, thickly coated with long matted white hairs, the lobes short, slender, acuminate, laciniately glandular-serrate, glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 20; anthers pale pink; styles 2 or 3, usually 2. Fruit ripening early in October, on slender hairy pedicels, in wide spreading many-fruited clusters, obovate, full and rounded at the apex, gradually narrowed at the base, slightly hairy at the ends, orange-red, 7–8 mm. long and 6–7 mm. in diameter; calyx prominent, with a deep narrow cavity pointed in the bottom, and much enlarged foliaceous coarsely serrate spreading persistent lobes sparingly villose and dark red on the upper side below the middle; flesh thin, yellow, sweet, becoming succulent; nutlets usually 2, gradually narrowed and rounded at the ends, ridged on the back, with a broad low ridge, penetrated on the inner faces with shallow cavities, 4.5–5 mm. long, and 3–3.5 mm. wide.

A shrub 2 or 3 m. high, with stems sometimes 3 cm. in diameter, small ascending branches, and slender nearly straight branchlets light orange-green and thickly covered with long white hairs when they first appear, becoming bright chestnut-brown, lustrous and marked by pale lenticels in their first season and dull red-brown the following year, and armed with numerous very slender nearly straight purplish spines 3-4 cm. long, persistent and compound on old stems.

Limestone cliffs of Spring River, Carthage, Jasper County, *E. J. Palmer*, (No. 9 D type) May 24, and October 27, 1901, October 27, 1902.

### 3. CRATAEGUS MISSOURIENSIS Ashe, Bull. N. C. College of Agriculture and Mechanic Arts, No. 175, 110 (1900).

Leaves ovate to obovate, acute and short-pointed at the apex, cuneate at the entire base, and coarsely often doubly serrate, with straight glandular teeth; nearly fully grown when the flowers open about the middle of May and then thin, yellow-green, lustrous and roughened above by short white hairs and paler and villous below especially on the slender midribs and primary veins, and at maturity thin, dark yellow-green, lustrous and scabrate on the upper surface, pale and still villous on the lower surface, 3.5-4.5 cm. long and 2.5-3 cm. wide; petioles slender, narrowly wing-margined, densely villous while young, often becoming nearly glabrous, 4-6 mm. in length; leaves on vigorous shoots oval, acute or acuminate at the ends, more coarsely serrate, occasionally slightly lobed, frequently 6-7 cm. long and 4-5 cm. wide. Flowers bad-smelling, 1.2-1.5 cm. in diameter, on slender hoary-tomentose pedicels, in small compact mostly 3-8-flowered tomentose corymbs, the lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, hoary-tomentose, the lobes long, slender, acuminate, laciniately glandular-serrate, sparingly villous or glabrous on the outer surface, villous on the inner surface, reflexed after anthesis; stamens 20; anthers rose color; styles 3-5, surrounded at the base by a ring of pale hairs. Fruit ripening early in October, on stout erect or spreading slightly hairy pedicels, solitary or in few-fruited clusters, short-oblong to oval or slightly obovate, bright orange-red, lustrous, 11-12 mm. long and 9-10 mm. in diameter; calyx prominent, with a short tube, a deep narrow cavity tomentose in the bottom, and elongated spreading lobes; flesh thin, yellow, sweet and succulent; nutlets 3-5, gradually narrowed and rounded at the ends or acute at the base, ridged on the back, with a broad high grooved ridge, penetrated on the inner faces by very shallow broad cavities, 4-4.5 mm. long, and 3-3.5 mm. wide.

A shrub 1-2 m. high, with slender branchlets thickly coated when they first appear with long matted white hairs, becom-



ing dark dull purple and pubescent in their first season and grayish brown the following year, and armed with numerous very slender straight purple ultimately gray spines 3.5–5 cm. long.

Bluffs and rocky banks of small streams, Monteer, Shannon County, *B. F. Bush*, (No. 277 type) July 29, 1899, (Nos. 383 and 387) May 25, 1900, (No. 504) May 16, 1901, (Nos. 3, 3 A, 3 B, 3 C, 3 E, 3 F, 3 H, 3 I) May and October 1905; Birch Tree, Shannon County, *B. F. Bush*, (No. 293, described as a slender tree) July 29, 1899, (No. 390) May 26, 1900; Pleasant Grove, Ripley County, *B. F. Bush*, (No. 455, described as a slender tree) August 10, 1899.

#### 4. *Crataegus globosa*, n. sp.

Leaves slightly obovate to oval or ovate, acuminate, gradually narrowed and concave-cuneate at the entire base, coarsely doubly serrate above, with straight glandular teeth, and occasionally very slightly divided above the middle into 3 or 4 pairs of small acute lobes; nearly fully grown when the flowers open about the middle of May and then thin, yellow-green, covered above by short white hairs and pubescent below, and at maturity thin, dark yellow-green, lustrous and scabrate on the upper surface and pale and pubescent on the lower surface especially along the slender yellow midribs and primary veins, 6–8 cm. long and 4.5–5.5 cm. wide; petioles stout, narrowly wing-margined to below the middle, villose early in the season, becoming puberulous, 1–1.2 cm. in length; leaves on vigorous shoots ovate to oval, more coarsely serrate, rarely slightly lobed, often 9–10 cm. long and 6–7 cm. wide. Flowers 1.4–1.5 cm. in diameter, on slender hoary-tomentose pedicels, in compact mostly 12–15-flowered corymbs, with linear-obovate to linear minutely glandular bracts and bractlets fading brown and often persistent until the flowers open, the long slender tomentose lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, densely tomentose, the lobes narrow, acuminate, finely glandular-serrate, pubescent on the outer, villose on the inner surface, reflexed after anthesis; stamens 20; anthers large, rose color; styles 2, surrounded at the base by a narrow ring of pale hairs. Fruit ripening early in October, on stout slightly hairy drooping pedicels, in many-fruited clusters, often persistent until after the leaves fall, globose or short-oblong, light orange-red, lustrous, marked by large dark dots, 7–8 mm. in diameter; calyx little enlarged, with a wide shallow cavity, and slender closely appressed often deciduous lobes; flesh thin, yellow, dry and hard, becoming soft after frost; nutlets 2, full and rounded at the ends, ridged on the back, with a broad low slightly grooved ridge, penetrated on the inner face by very large shallow cavities, 5.5–6 mm. long, and 3.5–4 mm. wide.

A slender shrub 5-8 m. high, with numerous small stems, and slender nearly straight branchlets covered when they first appear with long matted white hairs, becoming light chestnut-brown, puberulous, and marked by pale lenticels in their first season and dull gray-brown the following year, and armed with very numerous stout straight chestnut-brown shining spines 5-6 cm. long.

Dry gravelly banks of small streams near Monteer, Shannon County, *B. F. Bush*, (No. 7 B type), May 17 and Oct. 1, 1905, (No. 7) Oct. 6, 1905, (No. 7 A) Oct. 6, 1905, (No. 7 C) Oct. 1, 1905. To this species appear to belong the following specimens: Swan, Taney County, *B. F. Bush*, (No. 10) May 21 and September 22, 1905, (Nos. 10 B, 10 C and 10 D) September 1905, (No. 10 E), May 19, 1907; Christian County, near Swan, *B. F. Bush*, (No. 10 F) May 21, 1907, (No. P) September 25, 1905.

#### 5. *Crataegus obscura*, n. sp.

Leaves ovate to rhombic, acuminate, concave-cuneate at the entire base, sharply often doubly serrate above, with straight glandular teeth, and divided above the middle into 4 or 5 pairs of long slender acuminate lobes; fully grown when the flowers open about the middle of May and then thin, yellow-green, strigose above and villose along the upper side of the midribs and soft-pubescent below, and at maturity thin, light yellow-green and scabrate above, and paler and pubescent below especially on the slender midribs, and thin primary veins extending obliquely to the points of the lobes, 6-7.5 cm. long and 4-6 cm. wide; petioles stout, narrowly wing-margined nearly to the base, densely villose while young, becoming nearly glabrous, 1.5-1.8 cm. in length. Flowers 1-1.2 cm. in diameter, on slender densely villose pedicels, in mostly 12-15-flowered hairy corymbs, the much elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, thickly covered with matted white hairs, the lobes long, slender, acuminate, glandular-serrate, sparingly villose, reflexed after anthesis; stamens 7-10; anthers rose color; styles 2 or 3, surrounded at the base by a narrow ring of pale tomentum. Fruit ripening early in October, on stout hairy erect pedicels, in few-fruited clusters, obovate, full and rounded at the apex, abruptly narrowed at the base, light orange-red, lustrous, marked by small pale dots, 1-1.2 cm. long and 9-10 mm. in diameter; calyx little enlarged, with a very narrow shallow cavity, and elongated slender laciniately serrate spreading and incurved often deciduous lobes; flesh thin, pale yellow, soft and succulent; nutlets 2 or 3, usually 2, rounded at the ends, ridged on the back, with a narrow low ridge, penetrated on the inner faces by broad shallow cavities, about 6 mm. long, and 2 mm. wide.

A shrub 1-3 m. high, with slender stems covered with smooth dark bark, small ascending branches, and slender nearly straight branchlets loosely coated with long white hairs when they first appear, light orange-brown and pubescent at the end of their first season, becoming rather lighter-colored the following year, and armed with very numerous slender nearly straight purple ultimately ashy gray spines 3-6 cm. long and generally pointing toward the base of the branch.

Limestone cliffs of Centre Creek, near Webb City, Jasper County, *E. J. Palmer*, (No. 9 C type) May 18, 1902, October 4, 1907.

#### 6. *Crataegus spinulosa*, n. sp.

Leaves broadly ovate, acuminate, abruptly concave-cuneate at the entire base, sharply often doubly serrate above, with straight glandular teeth, and slightly divided usually only above the middle into 3 or 4 pairs of small spreading acuminate lobes; nearly fully grown when the flowers open about the 20th of May and then thin, dark yellow-green and roughened above by short white hairs and villose-pubescent below, and at maturity rather thick, dark yellow-green, scabrate and lustrous on the upper surface, paler and still villose on the lower surface especially on the stout yellow midribs, and conspicuous primary veins extending very obliquely to the points of the lobes, 5.5-8 cm. long and 4.5-6 cm. wide; petioles stout, narrowly wing-margined nearly to the base, villose, occasionally glandular, 1-1.5 cm. in length. Flowers 1.2-1.4 cm. in diameter, on long stout villose pedicels, in wide hairy mostly 15-25-flowered corymbs, the much elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, coated with long matted white hairs, the lobes gradually narrowed from the base, long, wide, sharply glandular-serrate, slightly villose, reflexed after anthesis; stamens 10; anthers bright rose color; styles 2 or 3. Fruit ripening early in October, on short stout slightly hairy pedicels, in few-fruited drooping clusters, short-oblong, slightly narrowed and hairy at the ends, orange-red, lustrous, 7-8 mm. long and 5-6 mm. in diameter; calyx little enlarged, with a deep narrow cavity, and small spreading and appressed lobes; flesh thin, yellow, soft and juicy; nutlets usually 2, rounded at the ends, ridged on the back, with a broad low grooved ridge, deeply penetrated on the inner face by long narrow cavities, 5.5-6 mm. long, and 3-3.5 mm. wide.

A shrub 2-3 m. high, with small stems covered with pale gray bark, slender nearly straight branchlets dark orange-green, marked by large pale lenticels and coated with long matted white hairs when they first appear, still hairy and light chestnut-brown at the end of their first season and dull

gray-brown the following year, and unarmed or armed with occasional slender straight light chestnut-brown spines 3-5 cm. long.

Low moist soil by streams, near Webb City, Jasper County, *E. J. Palmer*, (No. 9 A type) May 20 and October 13, 1901, May 19, 1903, (No. 14) *C. S. Sargent*, October 2, 1901.

**7. CRATAEGUS MOLLITA** Sargent, *Trees and Shrubs*, ii. 77, t. 136 (1908).

Gravelly banks of streams, Swan, Taney County, *B. F. Bush*, (No. 11 B type) May and September 1905, May 1907, also numbers 11, 11 A, 11 C and 11 D.

**8. Crataegus rupicola**, n. sp.

Leaves ovate to obovate, acute or acuminate, gradually narrowed and concave-cuneate at the glandular base, coarsely doubly serrate above, with straight glandular teeth, slightly divided usually only above the middle into 3 or 4 pairs of small acuminate lobes, strigose and becoming scabrate on the upper surface, and covered on the lower side of the stout midribs and slender prominent veins and veinlets with long white rather rigid hairs; nearly fully grown when the flowers open from the 15th to the 20th of May and then light yellow-green, and at maturity thin but firm in texture, yellow-green, 7-8 cm. long and 5-6 cm. wide; petioles slender, broadly wing-margined at the apex, densely villose-pubescent, glandular, with minute persistent glands, 1.5-2.5 cm. in length; leaves on vigorous shoots coarsely serrate, more deeply lobed, and often 8-10 cm. long and 6-7 cm. wide, with stout broad-winged petioles. Flowers 1.6-1.7 cm. in diameter, on short slender densely villose pedicels, in 5-8-flowered hairy corymbs, with lanceolate to linear glandular bracts and bractlets fading brown and often persistent until the flowers open, the lower peduncles from the axils of upper leaves; calyx-tube densely covered with matted pale hairs, the lobes wide, long-pointed and acuminate at the apex, villose, reflexed after anthesis; stamens 5-10; anthers large, bright red; styles 2-4, usually 3, surrounded at the base by a broad ring of long white hairs. Fruit ripening and falling early in October, on stout erect or spreading villose pedicels, in few-fruited clusters, subglobose to short-oblong, deeply concave at the insertion of the stem, bright orange-red, villose, with long soft white hairs most abundant at the rounded ends, 9-11 mm. in diameter; calyx little enlarged, with a broad deep cavity lined with hoary tomentum, and small spreading closely appressed lobes; flesh yellow-green, thick, dry and mealy; nutlets 2-4, obtuse and rounded at the ends, or when 4 narrowed at the ends, prominently ridged on the back, with a high deeply grooved ridge, penetrated on the inner faces by narrow deep cavities, 5.5-6 cm. long, and 4-4.5 mm. wide.

A slender shrub 2-4 m. high, with small stems covered with dark scaly bark, small spreading and ascending branches forming an open irregular head, and slender slightly zigzag branchlets dark green and hoary-tomentose when they first appear, becoming light chestnut-brown, lustrous and villose-pubescent or almost glabrous in their first season and dull reddish brown or gray in their second year, and armed with numerous slender nearly straight purplish shining spines 2-5 cm. long.

Dry rocky hills and barrens, and the dry banks of small streams, Swan, Taney County, *B. F. Bush*, (No. 3 A type) May 21 and September 22, 1905, (No. 3) May 19, 1905, (No 3 B) September 25, 1905, also *Trelease* and *Sargent*, October 8, 1899 (without number).

### 9. *Crataegus pudens*, n. sp.

Leaves narrowly obovate to rhombic or ovate, acuminate, gradually narrowed to the long concave-cuneate entire base, and coarsely doubly serrate above, with straight glandular teeth; more than half-grown when the flowers open about the middle of May, and then thin, yellow-green, setose, and villose along the midribs above, and pubescent below, and at maturity thin but firm in texture, dark green, scabrate and lustrous on the upper surface, pale bluish green and rough-pubescent on the lower surface, 5-6 cm. long and 3-3.5 cm. wide, with slender villose midribs and primary veins; petioles stout, wing-margined to below the middle, densely villose early in the season, becoming glabrous, 1-1.2 cm. in length; leaves on vigorous shoots thicker, usually broadly obovate, coarsely serrate, often 6.5-7.5 cm. long and 5-6 cm. wide, with narrow foliaceous falcate glandular-serrate stipules. Flowers 1.4-1.5 cm. in diameter, on long slender villose pedicels, in wide lax mostly 15-20-flowered corymbs, with oblong-obovate to linear minutely glandular bracts and bractlets fading brown and usually persistent until the flowers open, the long slender villose lower peduncles from the axils of the upper leaves; calyx-tube narrowly obconic, thickly coated with long matted pale hairs, the lobes wide, long-pointed and acuminate, glandular-serrate, glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 10; anthers pale yellow; styles 2 or 3, surrounded at the base by a broad ring of white hairs. Fruit ripening the end of September, on long drooping slightly hairy pedicels, in broad many-fruited clusters, short-oblong, full and rounded at the ends, green to yellowish red, 9-10 mm. long and 8-9 mm. in diameter; calyx little enlarged, with a very narrow deep cavity, and small spreading lobes often deciduous from the ripe fruit; flesh thin, yellow-green, hard and dry; nutlets 2 or 3, usually 2, full and rounded at the ends, ridged on the back, with a broad high grooved ridge, irregularly penetrated on the inner faces by shallow cavities, 6-7 mm. long, and 4.5-5 mm. wide.

A shrub 3-5 m. high, with numerous small stems, slender nearly straight branchlets thickly covered when they first appear with long matted white hairs, becoming bright chestnut-brown, very lustrous, and marked by many small pale lenticels in their first season, and dull reddish brown the following year, and armed with very numerous slender slightly curved purplish shining spines 4-5 cm. long and often pointing toward the base of the branch.

Gravelly banks of small streams, near Monteer, Shannon County, *B. F. Bush* (No. 11 type), May 15 and Oct. 3, 1905, (No. 11 A) May 15, 1905, (No. 11 B) May 15 and Oct. 7, 1905.

10. *CRATAEGUS MOLLICULA* Sargent, *Trees and Shrubs*, ii. 13, t. 107 (1907).

Rocky banks of streams, Monteer, Shannon County, *B. F. Bush*, (No. 8 type) May and October 1905.

11. *Crataegus insperata*, n. sp.

Leaves broadly ovate to broadly obovate, acute or acuminate at the apex, gradually or abruptly narrowed to the concave-cuneate entire base, sharply often doubly serrate above, with straight slender glandular teeth, and divided above the middle into 3 or 4 pairs of narrow acuminate lobes; fully grown when the flowers open about the 20th of May and then thin, light yellow-green and roughened above by short white hairs and soft-pubescent below especially on the midribs and veins, and at maturity rather thick, dark yellow-green and scabrate on the upper surface and pale bluish green and still pubescent on the stout midribs and slender primary veins on the lower surface, 5-6 cm. long and 3-5 cm. wide; petioles stout, wing-margined nearly to the base, villose early in the season, becoming glabrous, rose-colored in the autumn, 7-10 mm. in length. Flowers about 1 cm. in diameter, on slender pedicels covered with matted pale hairs, in compact 15-20-flowered hairy corymbs, with linear acuminate glandular-serrate bracts and bractlets fading brown and frequently persistent until the flowers open, the long lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, hairy like the pedicels, the lobes long, slender, acuminate, laciniately serrate, villose on the two surfaces, reflexed after anthesis; stamens 20; anthers dark red; styles 2 or 3, surrounded at the base by a ring of pale hairs. Fruit ripening in October, on stout reddish slightly hairy pedicels, in few-fruited clusters, obovate, light orange-red, lustrous, 1-1.2 cm. long and 8-10 mm. in diameter; calyx little enlarged, with a short pubescent tube, a narrow deep cavity, and small spreading and reflexed often deciduous lobes; flesh thick, yellow, sweet and succulent; nutlets 2 or 3, full and rounded, or when 3 narrowed and rounded at the ends, ridged on the back, with a broad low grooved ridge, deeply penetrated on

the inner faces by very broad deep cavities, about 6 mm. long, and 3 mm. wide.

A shrub 1.5–2 m. high, with small stems covered with dark bark, small ascending and spreading branches, and slender nearly straight branchlets orange-green and loosely covered with matted white hairs when they first appear, dull reddish brown and slightly pubescent at the end of their first season, becoming dark dull red-brown and glabrous the following year, and unarmed or armed with occasional slender short spines.

Rocky banks of Spring River, Carthage, Jasper County, E. J. Palmer, (No. 9 H type) May 19 and October 5, 1907.

With leaves considerably thicker than those of the other Missouri thin-leaved *Tomentosae* and thinner than those of the two Missouri thick-leaved species, *Crataegus insperata* serves to connect these two divisions of the group. The prominent midribs and veins impressed above indicate, however, a closer relationship with the thick-leaved species with which I have placed it.

## 12. *Crataegus ensifera*, n. sp.

Leaves rhombic to slightly obovate, acuminate at the ends, finely doubly serrate, with straight glandular teeth, and slightly divided above the middle into 3 or 4 pairs of small acuminate lobes; nearly fully grown when the flowers open from the 10th to the middle of May and then thin but firm in texture, dark yellow-green, lustrous, and roughened above by short white hairs and pale yellowish green and sparingly villose along the midribs and veins below, and at maturity thick, light yellow-green and scabrate above, pale and pubescent below, 5–6 cm. long and 3–3.5 cm. wide, with stout midribs, and thin prominent primary veins deeply impressed on the upper side of the leaf; petioles slender, narrowly wing-margined to below the middle, villose on the upper side while young, becoming glabrous, bright rose color in the autumn, 1–1.5 cm. in length. Flowers 1.3–1.4 cm. in diameter, on long slender slightly hairy pedicels, in wide mostly 16–20-flowered corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, slightly hairy near the base, glabrous above, the lobes long, wide, laciniately glandular-serrate, glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 20; anthers minute, pale salmon color; styles 2. Fruit ripening and falling early in October, on slender drooping slightly pubescent pedicels, in few-fruited clusters, oval, bright orange-red, lustrous, marked by small pale dots, 1–1.2 cm. long and 8–9 cm. in diameter; calyx prominent, with a wide deep cavity, and small spreading and appressed coarsely serrate lobes,

flesh thin, yellow, sweet and succulent; nutlets 2, rounded at the ends, ridged on the back, with a low ridge, penetrated on the inner faces by narrow deep cavities, 5.5–6 mm. long, and 2–2.5 mm. wide.

A tree 7–8 m. high, with a trunk sometimes 2 dm. in diameter, small ascending and spreading branches, and stout slightly zigzag glabrous branchlets light green when they first appear, becoming bright chestnut-red, very lustrous and marked by dark lenticels in their first season and dark reddish brown the following year, and armed with very numerous stout slightly curved bright chestnut-brown ultimately ashy gray spines 4.5–8 cm. long.

Roadside five miles north of Swan, in Christian County, *B. F. Bush*, (No. 23 B type) May 16 and October 6, 1907, (Nos. 23 and 23 A) May 16, 1907, (No. 23 C) May 16 and October 6, 1907.

13. *CRATAEGUS PERTOMENTOSA* Ashe, Jour. Elisha Mitchell Sci. Soc. xvi. pt. ii. 70 (1900).—Mackenzie & Bush, Manual Fl. Jackson County, Missouri, 108.

Leaves ovate to rhombic, acuminate, gradually narrowed and concave-cuneate at the entire base, sharply often doubly serrate above, with straight glandular teeth, and occasionally slightly divided above the middle into small acute lobes; about half-grown when the flowers open the middle of May and then thin, bluish green, villose on the upper side of the midribs and roughened above by short white hairs, and pale and villose below especially on the midribs and veins, and at maturity subcoriaceous, lustrous and scabrate on the upper surface, still villose on the lower surface, 5–5.5 cm. long and 3–4 cm. wide, with stout midribs often rose-colored in the autumn, and slender primary veins deeply impressed on the upper side of the leaves; petioles stout, wing-margined at the apex, sparingly villose early in the season, becoming glabrous, 8–10 mm. in length; leaves on vigorous shoots thicker, broadly ovate to oval, acute at the apex, rounded or concave-cuneate at the base, more coarsely serrate, often more deeply lobed, frequently 6–7 cm. long and 5.5–6.5 cm. wide. Flowers 1.5–1.6 cm. in diameter, on long slender densely villose pedicels, in wide mostly 18–20-flowered hairy corymbs, with linear-lanceolate to linear acuminate finely glandular-serrate bracts and bractlets fading brown and generally persistent until the flowers open, the much elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, densely villose, the lobes long, slender, acuminate, laciniately glandular-serrate below the middle, glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens 10; anthers pale yellow; styles 2, surrounded at the base by a broad ring of pale hairs. Fruit ripening late in September



or in October, on long slender hairy pedicels, in many-fruited drooping clusters, subglobose to short-oblong, scarlet, lustrous, marked by small pale dots, 8-9 mm. in diameter; calyx little enlarged, with a narrow shallow cavity and spreading often deciduous lobes; flesh thin, yellow, sweet and succulent; nutlets 2, rounded at the ends, slightly ridged on the back, penetrated on the inner faces by deep narrow cavities, about 6 mm. long, and 2.5 mm. wide.

A shrub 2-6 m. high, with slender stems covered with gray scaly bark, spreading branches, and stout slightly zigzag branchlets dark reddish brown marked by pale lenticels and sparingly villose when they first appear, becoming light chestnut-brown, glabrous and very lustrous in their first season and pale gray-brown the following year, and armed with numerous stout or slender nearly straight purple shining spines 3-6 cm. long.

Rocky barrens, Jackson County; widely distributed but not common, *B. F. Bush*, Grain Valley, Dodson, Independence.

Arnold Arboretum.

---

ADDENDUM.\*

2. *CRATAEGUS APIIFOLIA* Michaux, Fl. Bor.-Am. i. 287. (1803). — Chapman, Fl. 127. — Sargent, Silva N. Am. iv. 111, t. 188; Manual, 486, f. 401.

Neelyville, Butler County, *B. F. Bush* (No. 47), April 22, 1898; also from Arkansas, eastern Texas, and to Florida and southern Virginia.

---

\* p. 114, under MICROCARPÆ.